

Correspondence and Selections.

ON THE CULTIVATION OF THE POTATOE, AND OTHER FARINACEOUS
ROOTS, IN THE NEIGHBOURHOOD OF ALLIAPORE.

*In a Letter from Major GEORGE TWEMLOW, of the Bengal Army,
dated Ellichpore, 17th October, 1842.*

It has been well observed in the Report of the Society for the year 1841, that in India, "the land is left to pour forth its rich "annual stores, literally unaided by the application of the arts of "peace."

A time of peace to Asia is, however, it is to be hoped, approaching, when "the work of amelioration will spread the light of European "civilization over the land," and when the farmer of India will no longer be forced to content himself with a wrapper round his loins, for fear of being thought to possess property, nor place his surplus gains, instead of grain, under the soil.

Another of the wants of India, (next in importance to security of property,) is no doubt "security against the future visitation of that "horrible scourge, famine;" and it would appear to me that one mode would be, the growth of potatoes on the hills. It has been practically ascertained at Chickuldah near Gawilghur, that if in the month of June, (after the rains have set in,) potatoes are put down in the usual manner in the red soil, slightly manured, in October, potatoes will be ripe, and of a good quality, and productive crop, without any artificial irrigation or watering whatever, the only care requisite being to plant the potatoes on a gentle slope, (so that no rain-water may lodge,) to preserve them from weeds, and fence them from wild or tame animals, which, probably would be best done by moveable fences, in which during the dry months, sheep could be penned.

I forward three potatoes as specimens of last year's growth during the rainy season without any watering whatever, other than that of rain from the heavens.

Cotton culture at Coimbatore.

It would encourage the Goands and Bheels to grow root, and salib misree on the hills, tax free, it is not but some admixture might eventually be discovered, admit of the united nutritious qualities of the three being preserved in balls or cakes for future use, for cattle during times of plenty, or for food of man during famines. The Goands are known to stay the cravings of hunger by an unctuous clay until they can procure food, and also to eat the gummy exudation of the *Boswellia thurifera*, or frankincense tree.

SUGGEST OF COTTON CULTIVATION IN THE GOVERNMENT EXPERIMENTAL FARMS, AT COIMBATORE.

Extract of letter from Dr. R. WIGHT, Superintendent, Government Cotton Farms, dated Sept. 6, 1842, to the address of the late Dr. SPRY.

"Your letter of the 15th ultimo was received a few days ago, giving cover to the valuations of Messrs. Smith and Willis, of the various samples of American and Indian grown cotton I sent for that purpose. Oblige me by being the medium of communicating my thanks to these gentlemen for the trouble they have taken, and accept the same for the still greater trouble you have had with them. One object I had in view, was to learn the relative values of the samples grown at so great a distance from each other, and under circumstances so different. This has been fully attained, and confirms the correctness of the valuations assigned by native dealers here, by shewing them very nearly equal. In their actual values, as stated by these gentlemen, I confess I do not coincide, they being all under the mark, for the finer qualities. I think so, because the American samples were received direct from the Court of Directors, and were in my possession within little more than two months from the date of dispatch, carefully packed: and, to my mind, could not possibly have deteriorated 30 per cent. during transmission. Of the justice of this opinion, I am further assured by Dr. Royle, who in a letter received by the last overland, says, 'I am happy to inform you, that your New Orleans cotton grown on the red soil, is pronounced by the best

Aloe culture at Bolundshehur

judges in Manchester, to be quite equal to the finest qualities of the same kind of cotton from America.'

"It is true, there was not a sample of the cotton that favourably pronounced upon, among those sent to you; but the difference between the two assuredly does not amount to from 3d. to 3½d. the pound; the finest New Orleans fetching from 8d. to 8½d. in Liverpool. I shall send you a sample of our red soil cotton to be valued by Mr. Willis.

"This very encouraging result has led me to the determination, greatly to extend our sowings on that kind of soil, in the hope that, if the season should prove favourable, which hitherto has not been the case, we may have thirty or forty bales to send next year. Our crop, so far as it has yet been cleaned, has turned out well. I this day dispatched to Madras, for transmission to England, 5,500lbs. of New Orleans, equal to about 18,000lbs. of seed cotton. Our country cotton and second crop of New Orleans, is not yet ginned, but judging from its bulk, (I have not the figured statement at hand to consult) may amount to about as much more. The whole being obtained from barely 150 acres, actually under crop, may be viewed as a pretty fair crop, considering the disadvantages incidental to first attempts, and that upwards of 60 acres, comprising a detached farm situated at Errode, gave a very poor return; not more I think, than 20lbs., the land being all newly reclaimed from 'waste,' and very insufficiently prepared, owing to want of time to do it justice. We expect at least double the quantity this season.

"I was very glad to receive the packet of cotton seed you sent me, and would have been delighted had a second followed, as I have been disappointed in a large supply, promised by the Court, which through some unexplained cause, has not yet made its appearance, though it was to have been dispatched by the May steamer."

EXTENDED CULTIVATION OF THE ALOE IN THE DISTRICT OF BOLUNDASHEHUR.

*Extract of letter from THOS. TONNOCHY, Esq., Deputy Collector at
Bolundabehur, dated 5th January, 1842.*

"That very valuable plant, the Aloe, I am happy to say, I have succeeded in spreading very extensively in this district. I last year

Application for Cotton and Hemp Seed.

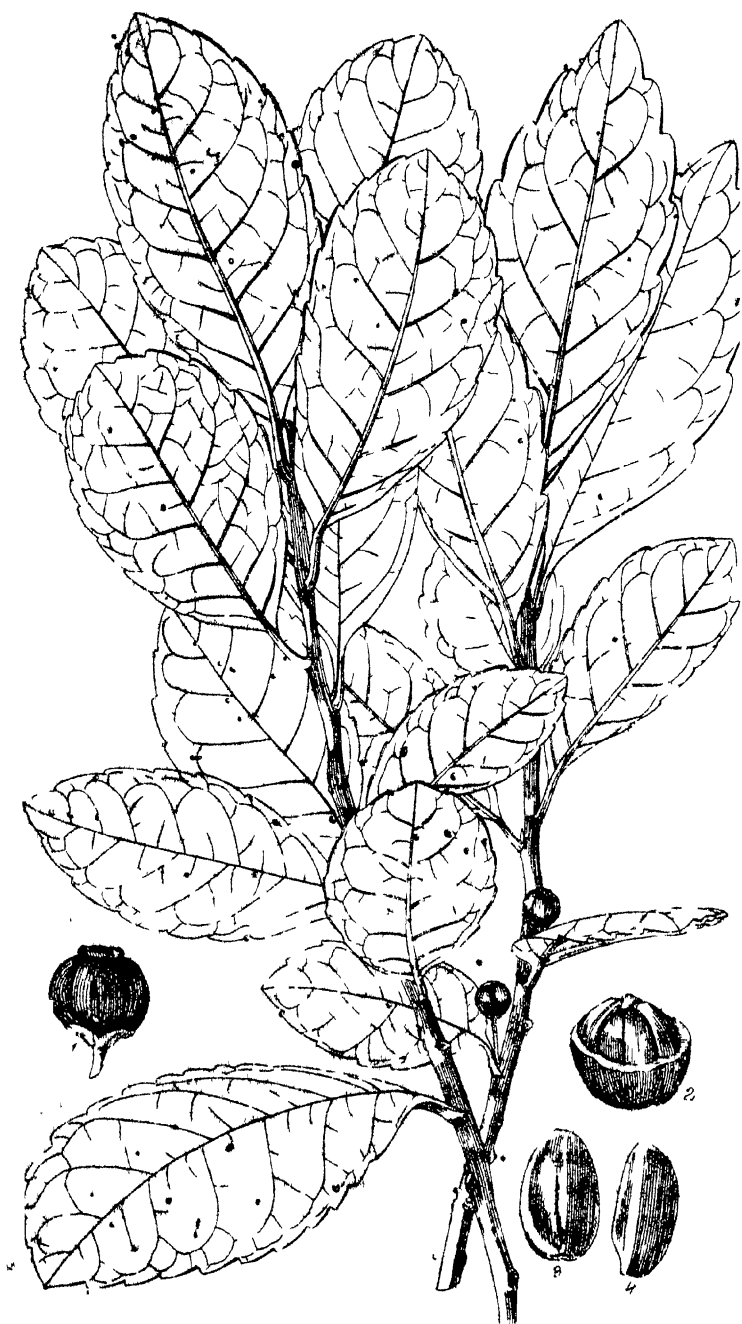
exposed in my Cutcherry a quantity of the dressed fibres, both loose and twisted, and also two Setringees made therefrom, laying up at the same time heaps of the seed on the Cutcherry grounds, the whole of which was not only immediately taken away by the Zumeendars, but calls were subsequently made, and answered to a great extent. I have encouraged the sowing of this, as a hedge to fields, and so soon as the value of the plant will be experienced in the supply of cordage for all agricultural purposes, and that supply ever at hand, in the long pole which the matured plant yields, and which will serve for supporting the roofs of cottages, which now, from the want of proper support, never outlasts the year; and the security which will moreover be afforded by the hedge itself to the crops growing within, there cannot be the least doubt of the system of enclosing fields being generally adopted, than which nothing could tend more to enhance the value of land. I wish the advantage could, through the means of the Agricultural Society, be extended through other districts, and I would gladly communicate with any person requiring information on the subject."

APPLICATION FOR FOREIGN COTTON AND HEMP SEED.

Extract of letter from SIR C. M. WADE, Resident at Indore, dated 14th September, 1842.

"Will you be kind enough also to forward to me by the present, or any other opportunity that may offer, some English hemp seed, and such varieties of cotton seeds as may be procurable.* With the former, in particular, I wish to try some experiments here, as I have seen no part of India, in which the indigenous plant seems to thrive so well, or to hold out so great a prospect of improvement, if due attention were paid to the introduction of good seed, and its proper cultivation. If you can send me any treatise on the subject, I will endeavour to bestow such care on its culture as

* A large assortment of several kinds of foreign cotton seed was transmitted to Sir C. M. Wade, soon after the receipt of his letter. A good supply of hemp seed, being portion of a consignment lately received by the Society, by the *Hindoostan*, through the friendly agency of Professor Royle, is now (Jan. 20th) about to be forwarded to Indore.—ED.



my leisure will permit. The cotton seed I will distribute in such localities within the limits of my charge, as are known to be favourable to the growth of that plant. In the higher parts of Malwa, it does not appear to flourish; but it is a staple article in Nimar, and in Jabwa, and other petty states bordering on Guzerat. Its failure in Malwa is ascribed to the variable climate, combining as it does, great moisture with sudden cold currents of air, which are occasioned by the superior elevation of the country, and the dense forests below the Ghats, by which it is surrounded."

Some account of the Paraguay Tea (Ilex Paraguayensis).

Few persons are ignorant of the fact, that, throughout a large portion of South America, a favourite beverage is employed under the name of *Maté* or *Paraguay Tea*. But many are of opinion that the plant producing it resembles the tea-plant of China, little aware that it is a kind of *Holly*, and a species not very unlike some of the varieties of our English *Holly* (*Ilex Aquifolium*). That there should have been a difficulty in determining the vegetable yielding so celebrated a drink, is the less surprising, when we consider that the country, where it has been extensively grown and prepared, whence it derives one of its appellations (Paraguay), and from which it is alone exported, has been held for a long period of years in the most complete state of tyranny and despotism of any country in the world, by the late Dr. Francia; of tyranny so great, that no stranger was admitted within its limits, or if admitted, he was detained a prisoner.

Until about 1822, nothing whatever was known respecting the particular genus and species of the shrub whose leaves furnished the *Maté*, or *Paraguay Tea*. The first of these two appellations originated in the name of the cup (*Maté*) from which the tea was drunk. It had further the name of *Yerba* (the herb or plant), *par excellence*. Azara, who, in many respects, faithfully describes the plant, is most faulty in referring it to the *Culm* of China. At length St. Hilaire, in the 9th vol. of the *Mémoires du Muséum d'Histoire Naturelle*, p. 351, in his *Aperçu d'un Voyage dans l'intérieur du*

Brasil," while at Curitiba, in the captaincy of St. Paul, found the *Maté* of Paraguay growing abundantly in the woods, and he takes occasion to observe that authors had been uncertain of the genus of the plant in question; but that having found it both in flower and in fruit, he was enabled to pronounce it to be an *Ilex*, and in a note he designates it as "*Ilex paraguayensis*," thus:—

"*Glaberrima, foliis cuneato-lanceolato-ovatis oblongis obtusiusculis remote serratis, pedunculis axillaribus multipartitis, stigmate quadrilobo, putaminibus venosis.*"

In 1824, Mr. Lambert, in a Supplement to his truly splendid work on the *Pines*, gave a description, and the first figure of this most interesting plant, under the name of *Ilex paraguayensis*; a denomination which I adopt, partly because I think it best indicates the country whence our first knowledge of it was derived, and also because M. de St. Hilaire himself, in the preface to his "*Histoire des Plantes les plus remarquables du Brésil et du Paraguay*," had cancelled his previous appellation, probably on account of its inaccuracy, and adopts that of *Ilex Maté*. However appropriate this name may be, that of Mr. Lambert had surely the right of priority in its favour, and is, in every respect, unexceptionable.

The costly nature of Mr. Lambert's work has caused it to be a sealed book to the general reader; and his interesting account of the plant, together with the possession of a living *Ilex Paraguayensis* in the Botanic Garden of Glasgow, have often made me desirous of publishing some account of it in a more popular form; but the want of flowering and fruiting specimens for a long time deterred me, though I applied in every probable quarter for them, and for information on the subject. Mr. Tweedie, at length, with great difficulty, obtained for me a barren specimen from a Fregehman, who had visited Paraguay; and about the same time I was favoured with a fruiting specimen by the Horticultural Society of London, equally from Paraguay. These are figured in our T.A.S. I. (see plate) and precisely accord, as to the foliage, with Mr. Lambert's figure. My next knowledge of the species was from Mr. Gardner, who sent me specimens, sparingly in fruit, gathered in the Organ Mountains (No. 346 of his collection), with the remark, "I did not meet with this in flower; but the structure of its fruit refers it to *Ilex*, as it agrees in every

respect with St. Hilaire's description. It forms a small upright growing tree about 15 feet high. At Mr. March's Fazenda, the leaves of it are used as tea, for which they are a good substitute. As three branches, with a single fruit on each, were all I could obtain, I have not thought it worth putting up specimens for general distribution."—These samples, be it observed, also precisely accord with Mr. Lambert's figure and description, and with my Paraguay specimens. Still I was without flowering branches, till my wishes being known to Mr. Miers, he most kindly sent me the use of his specimens (accompanied by drawings), from the Botanical Garden at Rio, where the leaves are pretty extensively used for tea. This I have figured at TAB. III., and it will be seen that the leaves are much longer and narrower than those of the specimens from Paraguay and the Organ Mountains; and, moreover, the undersides are invariably dotted with minute black glands. This is probably the plant of St. Hilaire. I was at first disposed to consider it a distinct species, and the more so, as tea prepared at Rio, which it frequently is, is universally acknowledged to be very inferior to that of Paraguay. Further observations, however, and the examination of specimens from Dr. Gomez of Rio, with the use of which I have been favoured by Dr. Lindley, and which seem to be exactly intermediate between Mr. Miers's specimens and those from Paraguay and the Organ Mountains, have satisfied me that they all are but varieties of one and the same plant: an opinion in which I am confirmed by some of the prepared leaves recently brought from Rio by Mr. Gardner, and given me with the remark, "Paraguay Tea, prepared in Brazil, and called by the Brazilians *Congoa*." Here the leaves are quite entire (not broken as in the Paraguay samples), and they exhibit all the variations I have above alluded to. So that there is every reason to believe, as St. Hilaire has suggested, that the inferiority of the Brazilian Paraguay foliage is due to the imperfect mode of preparation; as is the case with the Chinese Tea raised in Brazil, and even in Assam.

From the materials above mentioned, I am enabled to draw up the following character and description:—

Ilex Paraguayensis; glaberrima foliis ovato-lanceolatis ovatis obtusiusculis obtuse inaequaliter serratis inferne intercostatis. racemis

axillaribus paniculatis, pedicellis subumbellatis, calyce pubescente drupis (siccis) suboctosulcatis.

α. foliis laticribus ferè obovatis (TAB. NOSLR. I). *Ilex Paraguayensis*. Lamb, *Pin. Tab. II. cum descr.* (1824), Spreng. *Syst. Veget. Cur. Post.* p. 48 (excl. syn). St. Hilaire.

β. foliis minoribus supernè minus laticribus, subtùs sæpè nigropunctulatis

Ilex Maté. A. J. Gomes, in *Herb. Lindl.*

γ. foliis longioribus angustioribus sensim acuminatis ferè oblongo-oblancoelatis subtùs copiosè nigro-punctulatis. (TAB. NOSTR. III).

Ilex Paraguariensis. A. St. Hil. *Mém. du Mus. d'Hist. Nat.* v. 9. p. 351 (1822) note. De Cend. *Prodr.* v. 2. p. 15. A. St. Hil. *Voy. dans le district des Diamans et sur le littoral du Brésil*, v. 1. p. 273 (1833).

Ilex Maté. A. St. Hil. *Hist. des Pl. les plus remarqu. du Brés. et du Parag.* v. 1. p. xlj.

HAB. α. Paraguay; this form of the plant also probably in Uruguay and on the banks of the rivers tributary to the Paraguay, Organ Mountains, Brazil; Mr. Gardner.—β. Cultivated in the Botanic Garden of Rio; Dr. Gomes.—γ. Also cultivated in the Botanic Garden of Rio. (*Herb. Miers.*) Curitiba, Brazil; A. St. Hilaire.

Frutex 10-15 pedalis, ubique glaberrimus, ramis obsolete angulatis. Folia in α. subtri—in β. bi—et in γ. non raro 5 et 6 uncias longa, alterna, coriacea, breve petiolata, forma varia, in α. obovata, cuneata, obtusa, rarius sub-acuminata, in β. subangustiora præcipuè supernè, magisque acuta, in γ. oblanceolata seu oblonga, acuminata, supra medium latiora, omnia obtusè serrata, versùs apicem præcipue, inferne integerrima in petiolum cuneato-attemata, margine subrecurvata, utrinque venosa, subtùs pallidiora, in β. et γ. magis minusve minutè nigro-punctulatis. Costa supra canaliculata, subtùs elevata, valida. Venatio utrinque elevata, tenuis; venis patentibus suboppositis intra marginem arcuatim unitis et totè superficie reticulatim venulosa. Petioli semiunciam longus, crassiusculus, supra canaliculatus, subtùs angulatus. Racemi compositi, axillares, solitarii, foliis duplo triplove breviores; pedicelli breves subtriflori. Flores terminales copiosiores, subumbellati. Bractee parvæ, acutæ; ad

basia singuli pedicelli; rario etiam bini infra medium pedicellorum ultimorum. *Calyx* 4-lobus, lobis profundis, rotundatis, imbricatis, extus pubescentibus. *Corolla* alba, rotata: tubo brevi, laciniis 4, rotundatis, patentibus, concavis. *Stamina* 4, lobis alternatis, tubo inserta. *Filamenta* brevia. *Anthere* ovalet, laevae. *Ovarium* parvum, disco caroso impositum. *Stigma* minutum, obscure 4-lobum. *Drupa* globosa, magnitudine granæ piperis, calyce persistente basiscincta, stigmate 4-lobo terminata, siccitate 4-vel subceto-sulcata, tetrapyræna: pyrænis oblongo-triquetris utrinque acutiusculis, rugosis.

Reference to the figures:

TAB. I. *Ilex Paraguayensis*, α. from Paraguay. Fig. 1. Drupa, with its persistent calyx and crowned with the 4-lobed stigma; f. 2. the same, with the fleshy substance partly removed to show the four nuts; f. 3. Nut: all magnified.

TAB. II. Represents the Maté-cup and tube (drawn from one in the possession of Lady Callcott)

TAB. III. *Ilex Paraguayensis*, γ. from the Botanic Garden of Rio. Fig. 1. Flower; f. 2. ovary; f. 3. portion of the under side of a leaf, to show the minute glands: magn.

For nearly a century and a half, an infusion of this plant has been the common and favourite beverage of the settlers at Paraguay, who adopted the practice from the aboriginal people; and the custom soon extended itself to other parts of South America; so that, in proportion, to the population, in no part of the world is Chinese Tea more extensively drunk than the *Yerba*, *Maté*, or *Paraguay Tea*, is, throughout a great portion of South America; in Brazil, for example, in Peru and Chili, and everywhere to the south of those vast territories.

Azara, who wrote forty years ago, gives an interesting account of the *Herbe du Paraguay*; but offers no remark upon the botanical affinities of it; and his editor, M. Walckenaer, nine years later, falls into the strange blunder of considering it identical with the *Culen* of Chili (*Psoralea glandulosa*), simply, as it would appear, because the *Culen* is drunk as tea by the Chulenes. His history is no doubt in other respects faithful.

“The tree, which produces the *Paraguay Tea*, is found growing wild, among others, in all the woods which border those rivers; and

streams that fall into the Paraná and Uruguay; and also on the shores of those whose waters join with the river Paraguay, towards the North-east. I have seen several of these trees, equalling in size a tolerably large apple tree. But in those situations, where the leaves are regularly gathered, the parent plant only forms a shrub, because it is periodically stripped of all its foliage and small branches every second or third year—never oftener, however, as this interval is found needful for permitting the leaves to attain perfection, as they do not drop off in winter. The trunk is about the thickness of a man's thigh, with a shining and whitish bark, and branches, which, like those of a laurel, grow pointing upwards to the sky; and the whole plant has a tufted and much branched appearance.

"To prepare the '*Herb of Paraguay*,' (as the shrub which yields their favourite beverage is called, *par excellence*, by the natives of this country), the leaves first are slightly scorched, by passing the branches quickly through the flame of fire. The foliage is then roasted and broken down to a certain degree, and also subjected to strong pressure for a time, as the flavour is thought to improve by keeping. The Jesuits, who paid much attention to the culture and preparation of *Paraguay Tea*, were accustomed to remove carefully any little twigs that might be found among the foliage, and to break the leaves much smaller than was the practice of the natives. The article which they produced, was called *Caa-miré*: but the excellencies of its quality were not attributable to these precautions, and many persons prefer the less pulverized leaf; the principal point is to have the foliage thoroughly singed and roasted, and to gather it at a suitable season, when the *simis* is not impregnated with damp."

Azara farther mentions that two kinds of *Paraguay Tea* are made, the *mild*, or *choice*, (*celetta*), and the *strong* (*fuerte*). Paraguay and the province of La Plata consume all the first, the latter is exported to Potosi, Peru, Chili, and Quito.

In Brazil, the *Mate Tree*, also called there *Cangonha*, is found. It grows abundantly near Curitiba, in the Province of St. Paul, and at Foz de Iguaçu, an adjoining port; and thence, when political circumstances cut off all communication between Buenos Ayres and Montevideo, with Paraguay, the inhabitants of those cities obtained their supply of this favourite leaf. The Spanish Americans, per-

perceiving the difference between the *Maté* obtained in Paraguay, and that of Brazil, imagined that they were not the produce of the same tree, but a careful examination and comparison of authentic specimens enabled M. Auguste St. Hilaire, to assure the Brazilian authorities of their specific identity, and he was afterwards more firmly convinced of this fact, by examining the plantations of Paraguay Tea originally reared by the Jesuits in their old settlements. If the *Maté* from Paraguay be really superior in quality to the Brazilian plant, the mode of preparation is the sole cause of the difference.

Sensible of the importance which attached to the possession of this plant in their own country, the chief individuals in the Republic of Buenos Ayres were anxious to procure authentic and living specimens of the *Yerba de Paraguay*, and accordingly, in 1820, they sent thither Dr. Bonpland, the coadjutor of the learned Humboldt, whom they desired to bring away the shrubs, and to plant them on the shores of the river La Plata, near its mouth. The issue of this mission is well known; Bonpland was seized and detained in an honourable but close captivity for many years, during which, his many and powerful friends in Europe were wholly unable to procure his release. It is, however, by no means necessary to incur any such risks in order to disseminate the *Maté* throughout the Brazilian States. Care in the preparation of the foliage, and the same process as is pursued in Paraguay, will do away with all the difference between the original *Yerba*, and the produce of the same shrub in Curitiba.

The widely extended use of *Paraguay Tea*, and the great and increasing quantity consumed in South America, may well render its culture an object of attention; and the possession of extensive plantations thus becomes highly desirable. At every meal, and at every hour of the day, is *Maté* drunk, and the expense of bringing it to La Assumption doubles its original cost in the woods of Paraguay. The mode of using it, is to infuse a handful of the pounded foliage in a small spouted vessel, called a *Maté* (whence the plant derives its name), and to suck it hot through the tube, which is termed a *Bombilla*, and is perforated on the lower side at the end, with small holes, to prevent the escape of the soaked leaves which float on the top. The infusion must be made with fresh water each time, and

drink off immediately, or the liquor becomes as black as ink; but the leaves will bear to be steeped at least three.

The whole party is supplied by passing the *maté* cup from hand to hand, or rather from mouth to mouth; and the repugnance of Europeans to drinking thus indiscriminately after persons, so generally affected with filthy diseases as the South Americans, has given rise to the custom of putting small glass tubes into the spout of the *maté* cup, and sometimes each individual present brings his own tube. The *maté* cup is often made of a calabash, mounted with silver, and fixed on a stand; or of silver itself, elegantly chased and carved. Some persons add a lump of burnt sugar or a few drops of lemon juice to the beverage.

Three kinds of this tea are prepared and vended in South America, which pass under the names of *caa-cays*, *caa-miri*, and *caa-guazu*: the prefix *caa*, signifying the leaf itself. The former consists of the half-expanded buds; it will not keep, and is entirely consumed in Paraguay: the *caa-miri* is the leaf, as prepared by the Jesuits, carefully picked and stripped from the nerves before roasting, while the third* is made by roasting the foliage without any preparation; the two latter kinds are exported as far as Lima and Quito, the aromatic bitterness which resides in the freshly gathered leaf being much dissipated by carriage. About 5,000 quintals of *Paraguay Tea*, equivalent to 5,600,000 of pounds weight, are annually exported from Paraguay.

Wilcocke, in his "History of the Republic of Buenos Ayres," informs us, that "the principal harvest of the herb is made in the eastern part of Paraguay, and about the mountains of Maracaya, where it is cultivated in the marshy valleys which intervene between the hills, and never on the eminences themselves."

Many and highly various, say contradictory, are the virtues which the South Americans fondly attribute to the use of this their favourite drink. It is certainly aperient and diuretic; but its other qualities are more problematical; though to individuals who accustom themselves to it, the habit becomes second nature; and to break it off, or even diminish the customary quantity, is almost impossible.

The caa-guazu, also called by the Spaniards Verba de Palos.

Like opium, it certainly appears to rouse the torpid mind and make the restless; but, as in the case of that noxious drug, the immediate use is apt to occasion diseases, similar to those consequent on the practice of drinking strong liquors. Persons who are fond of it, consume about an ounce per day. In the mining countries, the maté is most universally taken, from the opinion which prevails among the Spaniards that the wines there are prejudicial to health; but the Creoles throughout South America are passionately addicted to this beverage, and never travel without a supply of the leaf, which they infuse and imbibe before each meal, and sometimes much of tetter, never tasting food unless they have first drunk their maté.

From the recent work of Mr. Robertson, called "*Francis's Reign of Terror, or Paraguay as It Is*," we extract the latest account of the mode of collecting the *Yerba de Paraguay*. "Near a small miserable town, bearing the imposing name of *Villa Real*, are situated the principal *yerbals*, or woods of the *Yerba Tree*, about a hundred and fifty miles higher up the Paraguay river than Assumption. So impenetrable and in many parts overrun with brush wood, are these forests, and everywhere so tenanted with reptiles and insects of a venomous description, that the only animals capable of being driven through them, are oxen, and mules; the former, necessary for the food of the colony of *yerba makers*, and the latter indispensable to the conveyance out of the woods of the tea, after it has been manufactured and packed. These poor beasts are so tortured with the bites of mosquitos, as to yell dreadfully when driven along, and the Peons, or slaves who ride the mules, have their legs cased in raw hides, faces vizored in tanned sheepskin, and hands protected by gloves of the same material. The party generally consists of from twenty to fifty souls, and is collected together by the merchant, who has obtained permission from the Governor to cut the leaves, and who immediately notifies in public his intention in those districts where the natives reside who best understand the business. The merchant comes, provided with goods, mules, hides, machetes (or hatchets), and a few axes, and he gives the persons whom he engages a certain quantity of articles in advance, on credit. Thus equipped, they set off in the direction of the *Forests of Yerba*. When bivouacking at night, a high stage is erected, fifteen feet from

the ground, whereon a roof is laid, and where the whole colony sleep, 'para evitar las mosquitas,' which never rise so high in the air, and also to be safe from the jaguars and noxious reptiles which swarm in the forests. When they come to a *yerbal*, or forest of *mate* trees sufficiently large to make it worth their while to halt and collect the leaves, they begin by constructing a long line of wigwams, covered with the broad leaves of the *Banana* and *Palm*, beneath whose shade they expect to pass nearly six months. The next process is to prepare the piece of ground, on which the small branches, twigs, and leaves of the *yerba* are first scorched. The soil is beaten with heavy mallets, till it becomes hard and smooth, and the leaves when thoroughly dried, are thither carried and placed on a kind of arch, made of hurdles, and called a *Barbaquea*. A large fire is kept up beneath, and the foliage thoroughly scorched without being suffered to ignite; after which, the dry platform is swept perfectly clean, and the leaves are beaten off the branches by means of sticks, and reduced nearly to powder. Each man is assisted by a boy called a *Quayua*, who receives, in payment for his services, the proportion of two pounds of leaves, for every twenty-five pounds which he helps to clear from the branches. Mr. Robertson informs us, that a rude mill is generally now substituted for this part of the human labour, where the scorched foliage and slender twigs are together ground to powder, thus completing the process, and rendering the *Paraguay Tea* fit for use. It is then conveyed to a large shed, called *Paráel*, where it is received, weighed, and stored by the Overseer.

The operation of packing is the most laborious part; this is effected by cramming and beating into a bull's hide, which is damped and lined firmly to the ground, the greatest possible quantity of the pulverized *Yerba*. From 200 to 220 lbs. are often pressed into one of these leathern sacks, which is then sewed up and left to tighten over the contents, and the heat of the sun will shrink the hide in two days, into a substance as hard as a stone, and almost as weighty and impervious too.

Gathered every morning by the cutters, who disperse singly, and on foot, through the woods, and return laden with as many branches as they can carry.

From the smallest shrubs of the *Yerba tree*, the finest leaves are considered to be obtained; but even from the same species, or *Perché*, the quality greatly varies, which arises from the labourers working in all sorts of weather, and when this is wet, the leaf is consequently inferior. Each Peon can collect as much Yerba a day, as will produce eight arrobas, or 800lbs. in weight of the prepared Tea. The selling price of the article enables his employer to give the labourer about a shilling each Arroba, and as the poor fellows are generally very industrious, and capable of enduring great fatigue and privation, they commonly make as much as eight shillings a day during the six months of Yerba gathering. By the ruinous practice, however, of gambling, to which master and man in South America are alike addicted, it seldom happens that either the merchant who collects and prepares Paraguay Tea, or the Peons who work for him, are otherwise than in continual distress and difficulties."

Ever since the beginning of the 17th century, this plant has been in common use throughout Paraguay, and there can be no doubt but that the Indians of Monda taught the practice of imbibing the infusion to their conquerors, since they were the natives who lived in the vicinity of the forests of Maté. Many of the Creoles and Mestizos now assert that the Paraguayians have exterminated the poor Indians, by compelling them to work at collecting this plant.

By the Jesuits, large plantations of the *Ilex Paraguayensis* were set in the vicinity of all their towns and settlements, a harmless method of gaining the good-will, by adding to the comforts and indulgences of their converts; but their practice has been too little followed, nor has government adopted the requisite salutary precautions and regulations that are needful for the preservation and propagation of so valuable a Tree. It would be desirable that its culture were extended, for only to carry the Paraguay Tea to Assumption, 150 miles, doubles, as before mentioned, its primary cost. At present, the *Yerbals* are situated in deserts, or surrounded with tribes of savages, who frequently attack and murder the labourers, already, through the nature of their employment, exposed to hardship, and liable to contract disease. By the formation of plantations round the civilized parts of the country, an improved method of collecting the leaves might also be adopted, the women and children could help

in gathering, and the ruinous method of tearing off the branches by which the tree frequently perishes, might be avoided.—*From the Journal of Botany for January, 1842.*

*On Organic-Mineral Manures. By Professor CHARLES SPRENGEL,
(translated from the German).*

Under the name of organic-mineral manures are comprised those materials which (as the name implies) are composed partly of organic remains and partly of mineral substances; thereto belong mould, mud, artificially-prepared compost, rubbish collected in the streets, the soil of sinks etc. These organic-mineral manures are of great importance in agriculture.

1. *Mould*.—Mould is that kind of soil which occurs often in low lands, is very rich in humus, and at times contains some remains of plants. If the situation is not too damp, and if the higher grounds which surround it are composed of clay, argillaceous, marly, or calcareous substances, it generally possesses such superior qualities, that it can be immediately carried and spread as manure, inasmuch as, under the circumstances just mentioned, it consists of a mixture of earths impregnated with humic acid and other materials strongly promoting vegetation. If however, this mould is accumulated in wet places, and the surrounding heights are composed of sand, it is, generally speaking, of such an anomalous composition that it will spoil any ground on which it may be carried, unless it undergoes some previous preparation, because in this case it contains much protoxide of iron impregnated with humic acid, and is, at the same time, very deficient in the earths combined with that acid, as well as in the saline substances which constitute a most essential nutriment of plants. The value of every sort of mould depends (as is the case with all substances used as manures) on its component parts. If it is therefore, intended to form at once an accurate idea, of the effect which this manure will produce, it is to be subjected to an accurate chemical analysis; especially the organic remains containing nitrogen are to be inquired into, inasmuch as its value will entirely depend upon their quantity—an analysis of which I have treated in my work on soils (*Bodenkunde*). The generally-received

opinion however is, that any sort of mould is only in so far useful as it supplies the soil with a greater quantity of humus. I have already analysed several sorts of mould which were used as manures, and for the sake of proving what I have just stated, I subjoin the analysis of a mould which came from a valley surrounded by sand-hills, and which, in its application, did not produce any considerable result.

100,000 parts of it are composed of—

52,910	„	silica and quartz.
31,269	„	humic acid.
10,200	„	coal of humus and vegetable remains.
2,312	„	aluminic, combined partly with humic acid, but mostly with silica.
1,554	„	protoxide and oxide of iron, combined with humic and phosphoric acid.
0,044	„	protoxide of manganese, partly combined with humic acid.
0,632	„	lime, mostly combined with sulphuric acid, but partly mixed with the coal of humus.
0,146	„	magnesia, partly combined with silica, or mixed with the coal of humus.
0,870	„	sulphuric acid, partly combined with calcareous earth, partly mixed with coal of humus and vegetable remains.
0,045	„	phosphoric acid, combined with oxide of iron.
0,008	„	common salt.
0,010	„	potassa, mostly combined with silica, and traces of substances composed of nitrogen.

100,000 parts.

• If an approximate calculation is made of the quantity of humic acid which is combined with the bases (alumine, manganese, and iron), it will be seen, that this mould contains at least 15,000 parts of free humic acid, acting as such. To this is to be added, that it contained neither humate of lime, humate of potass, or soda, nor any substance containing nitrogen; and another reason why it could not yield a good manure is, that it contained a quantity of humic protoxide of iron. Upon a Magdeburg acre of sandy soil,

about 50,000lbs. of ~~the~~ mould were carried, which was thus supplied with 15,680lbs. of humic acid, 5,100lbs. of coal of humus and vegetable remains, (manuring as soon as they are decomposed,) 316lbs. of lime, 74lbs. of magnesia, 435lbs. of sulphuric acid, 22lbs. of phosphoric acid (provided we assume that phosphate of iron in small quantities be a nutritive substance), 4lbs. of common salt, and 5lbs. of potash." In this case it will be seen, that it was merely the humic acid of this mould which was of any use, because the great proportion of gypsum was superfluous, and the other substances, in which the sandy soil operated upon was deficient, were contained in the manure in such small quantities, that they do not deserve to be taken into the account. This mould was therefore, as we said before, of very little use; so much so, that an additional quantity of common manure was required.

All those kinds of mould which are ascertained to possess superior manuring qualities, and which are found in low places, surrounded by clayey or argillaceous hills, are, on the other hand, composed of the following substances: 33 per cent. humic acid, 6 per cent. coal of humus, 2 p. c. alumina, $3\frac{1}{2}$ p. c. lime, $\frac{1}{2}$ p. c. magnesia, $2\frac{1}{2}$ p. c. oxide of iron, $\frac{1}{2}$ p. c. oxide of manganese, 42 p. c. silica and quartz or sand, $\frac{1}{2}$ p. c. gypsum, $\frac{3}{4}$ p. c. phosphate of lime, $\frac{1}{4}$ p. c. potash, 1-10 p. c. common salt, and $1\frac{1}{2}$ p. c. organic remains containing nitrogen. From the quantity of bases here, it is clear that such kinds of mould cannot contain any free humic acid; they consequently act very differently from the last. At times good kinds of mould contain only 12-13 p. c. of humic acid, and 45-50 p. c. of sand.

Whenever mould contains a great quantity of free humic acid, it must, if it is to yield good results, be either applied to a soil containing a great quantity of free bases, or it must be mixed with loam, lime marl, ashes, or dung, and left to remain in a heap for a long time, by which means those humates which are so beneficial to the growth of plants will be generated; otherwise the superabundance of humic acid will be detrimental to vegetation. But if the mould should contain much humic protoxide of iron, it must on no account be ploughed in soon after it has been spread, because, if left on the surface, the oxygen of the air will have time to change, by its contact, the protoxide into a peroxide. My own experience

has taught me that a field may be spoiled for several years if such a sort of mould is not left on the surface for one whole summer at least. It is best, therefore, to use such mould for top-dressing pastures, as in this case we never need fear that it will injure the subsequent crops.

It would be superfluous for me to detain again in what manner the humic acid of the mould is beneficial to vegetation, as this has been stated repeatedly on former occasions. If it contain organic remains composed of nitrogen, they form by their decomposition nitric acid, which then, combined with the different bases, forms saltpetre, possessing powerful manuring qualities.

Mould improves, chemically, all sorts of soil, even that richest in humus not excepted, because it contains generally from 50-60 p. c. mineral substances, amongst which are, as we have just seen, some very efficient ones. The mould, or the humus contained in it, renders a clayey soil more light, whilst a sandy soil is made thereby more firm, and kept in a damp state. It is, consequently, especially adapted for soils that burn, in which it is often more efficacious than even dung. If the soil is light and sandy, you will make use of a mould somewhat clayey; if, on the contrary, the soil is clayey, a rather sandy mould is to be employed. The quantity which is to be brought upon a certain area is to be determined by the proportion of its chemical ingredients; and although it is assumed that so much mould is to be placed on a field, that the surface soil receives thereby 2 per cent. of humus, it is evident that, for the sake of effecting this with 100,000lbs. per acre, a mould will be required containing 30 per cent. of humus; but as most sorts of it do not contain more than 15 p. c., 200,000lbs. per acre will be required. It is the readiness with which mould can be had that will determine the quantity to be used; for every one will first calculate how much the conveying of so many cartloads, or thousands of pounds upon an acre, will cost, for the sake of seeing whether the advantage to be derived from it be proportionate to the outlay of carriage and labour.

The length of time during which the effects of the mould may continue, cannot be easily determined, as it depends on its quality and the quantity used. Large quantities improve the soil after even

twenty and more years, whilst small quantities act but for a comparatively short time.

The most efficient mode is to carry the mould on such fields as are summer-fallowed, because in that case the most certain mixture with the surface is effected; which, however, is always much easier than by the manuring with clay, sand, or loam. Before the mould is ploughed in, it is to be well pulverised, which will have the advantage of causing the seed of weeds which may be contained in it to germinate, and of inducing the protoxide of iron contained in every sort of mould sooner to change into the oxide. It is this protoxide which produces the sharpness or acrimony which is so distinctly perceivable in some sorts of mould. It is also advantageous to scatter it in winter over growing rye, and then to harrow it in early in the spring, and roll it. The latter operation is, however, not advisable with a mould which is very light and rich in humus; such mould is better applied when the rye is a few inches long, otherwise it may be carried away by the wind.

If it contains a considerable quantity of vegetable remains undecomposed, it is always advisable to collect it at first into smaller, and then into larger heaps, for the sake of drying it, allowing it to decompose in that way for a year or a year and a half; and this will be still better accomplished if it be mixed with lime, marl, ashes, or dung, or concocted into compost, as I shall state immediately.

That mould or mud, in which there are many infusorial animalcules, will be very efficacious, is probable, but has not yet been ascertained experimentally. It may be expected that such mould will yield by its decomposition, either in heaps or strewed over a field, a certain quantity of sal-ammoniac or nitric acid; because infusoria, like other animals, contain a great quantity of nitrogen.

2. *Mud of Ponds and Ditches.*—The mud of ponds and ditches never contains so much humus as mould, and generally does not possess so many manuring substances as the latter, because the saline substances, easily soluble in water, will always flow off with it. But if the pond or ditch has no escape, and is situated in a locality where, along with the water, excrementitious materials can be conveyed to it, then it is obvious that such mud will be of much better quality. To determine, however, whether the mud of ponds

is worth having—an operation mostly requiring much labour—it will be always best to subject it to chemical analysis. I subjoin, in the first instance, the analysis of mud from a pond without escape, situated near a farm, and used as manure with great success.

100,000 parts of it consisted of—

75,802	„	silica and quartz.
2,652	„	alumina.
3,360	„	peroxide and protoxide of iron.
5,548	„	lime.
0,430	„	magnesia.
0,280	„	oxide of manganese.
0,150	„	potassa.
0,058	„	common salt.
0,625	„	sulphuric acid, combined with lime.
0,897	„	phosphoric acid, combined with lime and iron.
0,490	„	humic acid, combined with potassa, lime and magnesia.
5,000	„	coal of humus.
0,548	„	organic remains, containing nitrogen
3,160	„	carbonic acid, combined with lime.

100,000 parts.

Of this mud, about 50,000lbs. were spread upon one Magdeburg acre of sandy soil; consequently this area of land obtained thereby 1,300lbs. alumina, 2,774lbs. lime, 215lbs. magnesia, 75lbs. potassa, 29lbs. common salt, 308lbs. sulphuric acid, 448lbs. phosphoric acid, 745lbs. humic acid, 2,500lbs. coal of humus, and 274 lbs. of organic remains, containing nitrogen; all which substances produced a very good effect, for the soil was not deficient in humus, and they rendered the ground for many years very productive.

Another sort of pond mud, the water of which flowed away contained, on the other hand, in 100,000 parts—

88,000	parts of silica and quartz sand,
0,480	„ alumina.
0,133	„ peroxide and protoxide of iron.
0,358	„ lime, mostly combined with silica.
0,120	„ magnesia, also combined with silica.

0,260	gypsum.
0,070	potassa, combined with silica.
traces of	common salt.
traces of	phosphate of lime.
10,579 parts of humic acid and coal of humus.	

100,000 parts.

Those who ascribe all fertility of the soil to humus, might have asserted that this sort of mud would manure better than the former; but in reality it produced little effect. The action of even 100,000lbs. per acre was scarcely remarked.

At times, the mud of ponds contains a great quantity of protoxide of iron, in which case the same process is to be resorted to as has been stated in regard of mould. Such mud also contains, very generally, much coal of humus, on which account it should be dried and placed for a year and a half in high heaps, and to be well worked up several times before it is used. To facilitate the decomposition of the coal of humus, it is also useful to mix it with lime, dung, or ashes; in other words, to make compost of it. The more seeds of weeds the mud contains, the longer it should lie in heaps; in fact, all which has been stated previously with regard to mould, may be also applied to mud.

How much thereof is to be used on every acre of land, and how long its effects will continue, depend on the proportion of its manuring substances. The mud or scourings accumulated in the ditches of fields or meadows should never be neglected; if it is put in heaps and allowed to rot, it yields at times a very valuable manure, more especially if much grass or other plants had grown in such ditches.

3. *Sea Mud*.—This sort of mud, which accumulates at the mouths of rivers, is very often carried away during low tides, and conveyed to fields, meadows, and pastures. As its manuring powers are quite astonishing, I have subjected it to chemical analysis, and found that 100,000 parts are thus composed:

60,140 parts of very fine quartzose sand and silica.	
7,405	alumina.
3,300	peroxide and protoxide of iron.
0,200	oxide of manganese.

6,210	„	lime.
2,900	„	magnesia.
0,187	„	potassa, mostly combined with silica.
0,032	„	common salt.
0,610	„	phosphate of lime, and a little phosphate of iron.
0,390	„	gypsum.
9,200	,	humic acid, combined with alumina, iron, lime, and magnesia.
3,000	„	organic substances, composed of nitrogen
6,426	„	carbonic acid, combined with lime and magnesia.

100,000 parts,

This mud contained a great quantity of fragments of marine shells, whence the great proportion of carbonate of lime. The organic remains, composed of nitrogen, may owe their origin to marine animals; whilst the humic acid has been carried into the sea from the adjacent heaths, moors, ravines, and forests; and has formed humates of lime and magnesia by the decomposition of gypsum and chloride of magnesia. After sea-mud has been kept for a long time in heaps, about 40,50,000lbs. are used upon one Magdeburg acre of land; consequently the soil of this surface is enriched by 3,105lbs. of lime, 1,950lbs. of magnesia, 93lbs. of potassa, 16lbs. common salt, 305lbs. of phosphate of lime 195lbs. of gypsum, 4,600lbs. of humic acid, and 1,500lbs. of organic remains containing nitrogen. This explains the cause of the great manuring power of sea-mud. The most striking effects are always observed on meadows and pastures composed of peaty and marshy soils. In cases where such land yielded nothing but coarse grasses and rushes, immediately after the application of sea-mud sweet grasses and trefoil will make their appearance. When applied to fields, very fine wheat will be grown, which is said not to be subject to mildew.

4. *Mud of ditches enclosing Fields or Highways.*—In many countries it is usual to collect the water from the ditches of sloping fields, or which flows down from much frequented roads into deep reservoirs, for the sake of its depositing there its manuring substances. As soon as these reservoirs have been filled, the contents are thrown

into large heaps, with which the fields are afterwards manured. This mud is the better the more fertile the fields are whence it has been derived—or the more frequented the roads are, as in these cases it will contain much animal excrements. It is best adapted for light soils, as it is of very fine grain, and very clayey. The mud derived from roads is most valuable when they are paved with basalt or limestone, as in that case the mud is rich in lime, potash, and soda. But although in this case the mud scraped from high-roads is a very valuable manure, it is of little or no value if the road is made with quartz or gravel. It is always advisable to collect the mud of roads into heaps, and to work them over several times; for it always contains much protoxide of iron (derived from wheels and horse-shoes). If this is neglected, a field may be poisoned by its application.

5. *Mud from streets in towns.*—In the neighbourhood of large towns, the mud or sweepings of streets afford a kind of manure of great value, as is well understood in Belgium. There the mud scraped from the streets of a town, containing 60,000 inhabitants, is often sold for 20,000 dollars; whilst in many towns in Germany, thousands are paid every year for getting rid of it. The mud of streets is composed of animal excrements, soil, filth, house-sweepings, soap-suds, urine, vegetable remains, the rubbish of buildings, ashes, &c.; it must therefore be necessarily an efficacious manure. On account of the great diversity of its constituent parts, it is advisable to prepare it properly before being used—viz. to put it in large heaps; to moisten it, if it be too dry, with water, urine, or dung-water; to work it up after a few weeks, and to take out all broken earthenware, stones, &c. The heap, after standing for some time, will be completely rotten, and fit to be conveyed on the land, where it is best adapted for top-dressing.

The best street mould is always obtained in towns where an active traffic and many trades are carried on, and where the paving is either basalt or limestone. Great care must, however, be taken, that such mould does not convey noxious substances upon the land, which may very well be the case if it contains much refuse of dyers' manufactories, &c., in which there are often mixed mineral substances, noxious to vegetation.

6. *Rubbish of Farm-yards, &c.*—In the yards of farm-houses, where carts and waggons draw up, earth is always to be found which consists of animal excrements, vegetable remains, and similar substances. This may be scraped up at intervals, and either used as a top-dressing on meadow land, or may be added to the heap of compost; it usually contains seeds of weeds.

7. *Compost*—Under this name is comprised an artificial composition of mineral, vegetable, and animal substances. Layers of these different materials are collected into large heaps, and moistened with water, urine, or dung water, if they are too dry; after lying for several weeks, they are carefully worked up, and immediately collected into heaps again, and again moistened as before, if necessary; after which they are left quiet for a few weeks, again worked up, again put in heaps, and after a few weeks subsequent to the last-mentioned operation, the compost is ready to be used as manure. In making compost, the chief point to consider is, that no substances are mixed together which act disadvantageously upon each other, or cause the evaporation of the manuring substances; on the contrary, such only are to be brought together as mutually decompose and improve each other. It is true, that for making compost, earth rich in humus, dung, marl, lime, common ashes, the ashes and lye of soap-boilers, loam, clay, gypsum, common salt, bone dust, the refuse of salt-works, peat, turf, weeds obtained from fields, meadows and gardens, dried heath, human excrements, the sweepings of thrashing floors—in short, all those materials may be used which we have hitherto spoken of; still, it requires a knowledge of their component parts and several qualities, so to mix them, that the best compost may be produced. In fact, it is not so easy as it is generally believed, to prepare a compost perfectly suited to the purposes of the cultivator. Whoever wishes to prepare the best possible compost, must leave nothing to chance; on the contrary, certain fixed principles must be attended to, and chemistry must be consulted; because it is that science only which can teach us in what substances soil is deficient, and what are to be applied, in whatever form, if the most abundant crops are to be produced.

However advantageous the preparation of compost be, it has, nevertheless, been stigmatised as useless; and it has been asserted,

that it occasions unnecessary labour, without producing any essential benefit. Its advantages are, however, undoubted. Among the principal are the following :

1. By mixing different substances and putting them into heaps, their more perfect combination is secured by the heat thus generated. If, on the contrary, these substances are carried unprepared upon the field, they cannot come into close contact, and there is no generation of heat, which is such a powerful aid of chemical combinations.

2. By making compost, substances of little original value as manures are speedily converted into most powerful fertilisers, especially humus, whether in the state of coal or of acid, and vegetable remains, which, by close contact with dung, loam, lime, and marl, are changed into a fertile earth ; for in this way many humates are created. If, therefore, in preparing compost, land be for some time deprived of manure, it is to be considered, on the other hand, that in the course of half a year, by one cart-load of manure, two cart-loads of sour or barren humus are converted into an excellent fertiliser, whereby the labour of making compost is fully repaid.

3. If dung and urine are mixed in compost heaps, with earth rich in humus, no part of the ammonia disengaged by those substances is lost, because it becomes chemically combined with humic acid. The longer, therefore, the dung is left in the dunghole, the more advantageous will be the preparation of the compost.

4. In compost heaps, the seeds of weeds, which are often contained in earth rich in humus, as well as in the dung itself, are brought into germination, so that the crops, will be afterwards more clean.

5. If the earth used in the making of compost contains protoxides of iron, or other substances detrimental to vegetation, they are decomposed by their close contact with dung, ashes, lime, and marl, as well as by the heat and frequent working of the heaps (whereby contact with atmospheric air is much facilitated), and they cease to be injurious to plants.

6. In consequence of the heaps of compost comprehending all the materials of manure in a small compass, those substances are thus brought, without difficulty, into that condition which is most advantageous to plants. If scattered upon a field, they are often unable to

attain the state of decomposition, because they are deprived of the necessary degree of humidity : a compost heap, on the other hand, may be wetted with water, urine, or dung water, if the substances which have to act upon each other are too dry.

7. When thoroughly well-prepared compost is used for manure, crops will not be laid, because the substances in dung, by which this is caused, have entered into combinations which will over-force the plants.

8. By the use of compost, weak crops may be rapidly improved, because it can be applied as top-dressing even when plants have attained a considerable size. Compost always contains much perfect vegetable nourishment, which, as it can be at once received by the roots, improves vegetation speedily.

If, therefore, all the advantages of compost are considered, it becomes obvious that they are so important, that no opportunity of preparing it should be omitted. Compost is most generally used in England, especially in the counties of Bedford, Hereford, and Berks. It is of the greatest value in light, dry soils, which, as they are always rich in humus (or ought to be so at least), are thus kept damper. It also prevents the particle of manure from sinking into the under soil, for compost is always used as top-dressing, or is harrowed in with the seed. For a light, dry sandy soil, a fresh manure, or one composed of much straw, is more detrimental than useful ; but if this sort of manure is brought into a heap of compost, it is converted into substances advantageous to vegetation, without any of the manuring substances being thereby lost. . . .

One of the objections against the making of compost is, that much carbon, is lost by being converted into carbonic acid, which however, is only the case when ashes, marl, lime, loam, or alumina, have been added in too small a quantity. If these substances are not deficient, dung, as well as earth rich in humus, will yield humic instead of carbonic acid, which will combine with the bases of marl, ashes, &c., into humates, and thus become chemically fixed.

In making compost, some general rules are always to be observed, of which the following are most essential :—It is best to use fresh dung, containing much straw, (especially horse or sheep dung), which in decomposition, not only gives out a good deal of heat,

but also—which is very important—keeps the heap loose, and facilitates the access of oxygen. By the decay of fresh strawy dung, ammonia is also generated, and acts as a solvent on the coal of humus, or, as the loose state permits a free access to oxygen, nitric acid is formed by the organic remains containing nitrogen. On the latter account, a frequent working and stirring of the heaps of compost is necessary, and has the additional advantage of bringing the substances better together, and mixing them more thoroughly.

If quicklime is used in making compost, no more is to be employed than is sufficient to saturate the humic acid of the humus, otherwise it will expel the ammonia which has been combined with humic acid. For the sake of preserving the ammonia the lime, upon the first construction of the compost-heap, ought never to be brought into immediate contact with the dung; on the contrary, the quicklime moistened with water ought to be placed between two layers of humus. The same precaution is to be observed if fresh wood-ashes are used in the composition of compost, as the potassa equally expels the ammonia; which, however, does not take place so readily, because, being combined with carbonic acid, it is retained mechanically by the mass of materials.

If the earth employed is rich in humus and clayey, it is advisable to add Potato straw, Pea-haulm, or coarse materials of a similar kind, so as to keep the mass more loose. The layer of earth should also not be too thick, or it will still become too compact.

The humus brought into compost-heaps ought never to be too damp, as it is apt to cool too much the dung it is mixed with, and not to undergo decomposition soon enough. It is, generally speaking, of the greatest importance that the compost-heaps be never either too damp or too dry, because in either case the rotting of the organic remains will be impossible. As it is mostly likely to be too dry, it should be supplied with the moisture required which should be either urine or dung-water; or if there be neither at hand, more water may be used instead.

Everything added to the compost-heap, whether turf, humus, marl loam, &c., ought to be broken into small pieces, because they will then act better on each other, and sooner become substance possessing manuring qualities.

The turning over the heaps, and making them up again, must be done very quickly, because heat has great influence in the decomposition of the substances brought together, and the heap, if worked up slowly, will become too cold. In like manner, too much heating of the mass is to be avoided, for that would cause the loss of ammonia, which, however, is not so much to be apprehended, unless too much dung has been used.

Compost must not be used before it is thoroughly made, which is known by all the organic remains being decomposed, or at least being tender, so that the compost will have the smell of rich garden soil. It may be that more money has been sunk in a compost-heap than one likes to retain unemployed; but we may rely upon it that nothing is saved by employing such a substance before it is thoroughly fit for use.

Making compost is best resorted to at a season when cattle and labourers are least engaged, and when manure is no longer required for the field; consequently, after the sowing of winter and summer crops. To compost prepared in autumn, more dung is to be added than to that which is made in spring, because as the cold of winter interrupts fermentation and the decomposition of organic remains, the fresh dung will counteract this by the heat it gives out. In order to prevent the cold from penetrating the heap, or, to speak more properly, to keep the heat in it, it is as well to cover it all over in winter, either with Potato-haulm, leaves, or similar substances. The decomposition of the organic remains, &c., will then proceed vigorously under this cover; so much so, that the compost—especially if it is worked up once or twice during mild weather—may become fit for use even by the subsequent spring, and may be used for summer crops, which is very important. On the other hand, compost which is prepared in spring will (if properly mixed and treated) be so far decomposed by the autumn, that it may be used as a manure for Rye or similar crops; because, as at the time it will have been from four to six months in a heap, the organic substances contained in it must have been very woody, fibrous, or carbonaceous, if they have not been decomposed. Decomposition can always be hastened by the admixture of lime, ashes, or dung in somewhat larger quantities than usual; in which case, compost may be fit for use in three months.

Organic Manure.

It is in the habit of making compost, acts rightly if he continues making it during the whole winter and summer, because in every farming establishment there must continually be substances fit for incorporating with the compost-heap; as, for instance, refuse flax, hemp, offal, sawdust, scrapings, ashes, weeds, building rubbish, moss, &c. It is also best to have the compost-heap near the dung-hill, so that the superfluous dungwater and urine can be poured upon it, and the dunghills will in this way be kept in the necessary state of dryness. But in this case the addition of plenty of humus must not be neglected, because it has to fix the ammonia which will be developed; this is the more necessary if night-soil has been added to the heap of compost.

If compost is prepared in very large quantities, the substances used in it should be conveyed to the neighbourhood of the field which you wish to manure, and thrown up around a place left open for that purpose. The substances which are at hand are then placed necessarily in layers in the compost-heap. This is to be of a round form, and the sides steep, which will preserve heat best. The height of 6 or 7 feet will be the most appropriate. At the bottom, a layer of turf or humous earth, 4 or 5 inches thick, is to be placed, to receive and absorb all manuring particles which may run downwards. The layers of different substances must not be too thick, otherwise the inner portion of each will be very little acted upon and decomposed by that of the adjoining substance. The layer of dung is always made thickest, as it will be almost reduced to nothing by decomposition; next follows a layer of humous earth, which may be 3 or 4 inches thick. The layers of marl, lime, and especially peat and wood ashes, must be thinnest; whilst any salt that may be used—for instance, gypsum, common salt, soda, potash, pulverised bones, sulphate of soda &c.—are to be strewed among the humous earth, in a proportion previously calculated. The intimate mixture of these substances will be still more completely effected by subsequent working up, when everything is to be properly chopped to pieces. It will be still more aided by moistening with common water or dung water. It must never be forgotten, that upon a most intimate mixture of all the substances contained in the heap, the subsequent good effects of compost depends, on which account it is impossible to direct too much attention to that point.

Compost may be also prepared in stables, *below* or *behind* the cattle; but it will turn out to be never so well mixed as that prepared outside; nevertheless the manuring properties of the former may be somewhat superior to those of the latter, for reasons previously stated.

I have observed, in another place, that compost, being a very concentrated manure, ought never to be buried in the ground, but should be used for top-dressing or be harrowed in with the seed. It may be also used beneficially by putting it in small holes at a certain distance from each other, as is done with Potato or Maize crops, &c. To winter crops it may be given most advantageously in the early spring, when there is no fear of the manuring substances being dissolved during winter by rain.

The quantity of compost to be used on a given area depends entirely on its quality; it may require 2,000lbs. per acre, or it may be 10-20,000lbs.; 1,000lbs. of compost will, however, rarely act so long as 1,000lbs. of dry dung, because the former contains all its substances in a form particularly well suited for quick absorption by plants. But it is that very quality which speaks in its favour.

The simple compost of the English is composed of ten parts of humous earth, two parts of dung, and one part of lime, and is a very powerful manure. Less so is a compost composed of one part of lime, four parts of dung, and 20 parts of humous earth. It is not to be left in a heap more than three months, and it is to be worked up two or three times. If marl is used instead of earth, then one part of lime, five parts of dung, and ten parts of marl, are to be mixed; the heap is to be covered with earth, after three months to be worked up with the shovel, and then carried on the field.

• In order to prevent lime, ashes, and humous earth from getting into layers in the heap (in which case they will not act properly upon each other), it is best to throw them in the first instance into a heap by themselves and in layers, then in three or four days afterwards to turn them well over, and to add this mixture to the compost-heap.

There have been cases, even in Germany, when the discoverer of an efficient compost has obtained a patent. One of these paten-

ted manures is said to be prepared in the following manner:—At the bottom is placed a layer of very strawy dung, 15 to 20 inches thick; or, in the absence of this, mere straw, forest sweepings, fern, heath, thistles, potatoe-haulm, turf, mould, and marl. This foundation is wetted with dung-water, or, if this is not at hand, with common water, and covered over with night-soil, dung of poultry, sweepings of the streets and yards, pulverised bones, offal, kitchen slops—in short, with every soluble substance of that kind which can be procured. Over this 1-4th of an inch of pulverised sulphury coal-ashes or wood-ashes are strewed, or 1-8th of an inch of fresh wood-ashes will do as well; over this is placed a layer of good earth, mould, or marl, 3 inches thick, all which is covered by a layer of fresh dung of horses, sheep, or cattle, 18 inches high, over which ashes are again strewed. The heap is next wetted with water, and is then covered with a layer of pond-mud, ditch-scrapings, mould or marl, and 1-4th of an inch of ashes is again strewed over it; and, finally, dung, straw, and other substances are placed on the top, in the same succession as before, until the heap is 8 or 9 feet high. The heap is left quiet for 2 or 3 weeks in summer, or 4 to 6 weeks in winter, when fermentation will come on, as the smell will indicate. If, however, in any part of the heap a considerable degree of heat should be observed, the spot is immediately to be covered with a layer of earth, 3 or 4 inches thick, and wetted with water: if, on the contrary, spots should be discovered where the mass does not ferment, holes are to be made there, so that air (oxygen) may reach these inactive parts. After the compost has lost its pungent ammoniacal smell, and every substance has been properly dissolved, it is to be well wetted with water, worked up, and again put in heaps, 8 or 9 feet high, and covered with a layer of rich earth, 10 to 15 inches thick; and when it has thus remained for some short time, it may be carried on the fields, and harrowed in with the seed. I cannot be doubted that compost thus prepared will be very serviceable, as the soil will receive more from these combined substances than any one of them could effect singly; but to say that its preparation is in accordance with chemical principles, is only half true because, in the first instance, a great deal of a most powerful manuring substance, namely, ammonia, is lost, and if this does not

escape, either more humous earth, or less dung, or, dung-water, or other nitrogenous substances, must be added. • Even assuming that the covers of earth, or the wetting with water, will somewhat diminish the evaporation of the ammonia; still a great part of it will be lost, as the very smell will fully indicate. These are circumstances that cannot be too carefully considered; for we may rely upon it, the manner in which manure is prepared is quite as important as the way in which it is used.

One general remark applies to compost. Its preparation will only be of real use, when materials, which do not afford singly an efficient or convenient manure, are made to do so by their mixture. Every farmer has it in his power so to compound the best from his store of manuring materials, that the defects of his soil may not only be remedied, but that the crops may receive those substances in sufficient quantity which are required for their vigorous growth. To do this, however, it is requisite to know not only the component parts of the soil, but also those of the crops. If these are not taken into account, no clear idea of the composition of manure will ever be obtained; and many substances of real value will be tried without result, although one single accurate chemical analysis of the soil would point out at once what it is that the land required.—*From the Gardener's Chronicle*, 1842.

On destroying Insects by means of Boiling Water.

I send you the following remarks on the utility of boiling water for the destruction of insects generally, in addition to those I made a few weeks ago on the destruction of the *Otiorynchus picipes*. I have found it to kill effectually all such Beetles as feed on plants in the day-time; for instance, such as we so frequently see devouring the crops of Peas and Beans, as well as those which sometimes completely strip whole plantations of Raspberries of their foliage. Preparatory to using the boiling water, the ground between the rows of any crop should be raked fine; and when a little time has been allowed for the insects (which will have fallen off and made their escape during the operation) to re-ascend the stems, one person should shake the plants gently to dislodge them again, and throw

them on the ground; another closely following and pouring a moderate quantity of boiling water over the whole surface of the ground about him. To destroy those that feed in the night, and secrete themselves in the earth during the day, it will be necessary to prepare the ground as before, and make drills or small furrows near the plants, and fill them with tanner's bark, bruised beanstalks, or sugar and that would afford concealment to the insects; and in the day-time to pour boiling water over them, which will effectually destroy them; without injury to the plants, even should a moderate quantity have fallen on the stems. The Black Beetle which feeds on ripe Strawberries may be destroyed in the same way, by forming traps in the paths. The Woodlouse and Earwig, which often prove injurious to wall-fruit, may be successfully destroyed, by first making drills in the earth close to the wall, &c. providing a cover for them of the materials mentioned above, and then by applying hot water in the day-time. This should be done before the fruit is ripe, although it may be performed after; for the insects may be dislodged by carefully stirring the clusters of leaves, and gently sponging the branches among which they are lurking; and when they have retired to the hiding-place provided for them, the boiling water may be applied. To destroy woodlice in Cucumber and Melon frames, pits, &c. make traps, as before, round the sides; place over them here and there a few leaves, in order to induce the insects to feed and lodge there, and then scald them. Hot water may also be used with advantage in frames and pits when the old Melon and Cucumber plants are cleared away in the autumn, and in the forcing and plant houses when the Vines, Peach-trees, &c., are pruned, and the plants in general are regulated. Everything—walls, frames, bark-pits, earth, &c.—should then be watered copiously; and thus the red spider, thrip, aphides, cocci, &c., which may have been shaken from the trees and plants, will be totally destroyed, and their future depredations prevented. Ants are supposed by some to be useful in destroying the aphides. This, I think, is erroneous, for when they are seen wandering over the plants, they are in search of the excrementitious fluid ejected by the aphides or cocci. When, therefore, they prove troublesome in gardens, boiling water will be found to be the best remedy for them. The water should be poured into the nests,

after making holes in the latter with a pointed stake, to enable the water to spread the more readily, and so do the more execution.
—*Joshua Major, Landscape-gardener, Knosherpe.* •

To prepare Dried Specimens of Plants.

The modes of preparing dried specimens are various, depending very much upon the circumstances under which they are to be procured. To explain, therefore, the general principles upon which they should be prepared will, perhaps, answer every necessary purpose, and enable those who may have been previously unacquainted with the mode of drying specimens, to apply general directions to their own particular case. First, as to selecting the specimens for drying. They should be chosen when in flower, or when in fruit, or in both those states; and they should be reduced, if very large, to such a size, that they may be conveniently laid between the two leaves of a sheet of common brown paper; but they should be in all respects in as perfect a state as possible. Generally, no other preparation before commencing the operation of drying is necessary; but there are certain plants, such as Pinus, Heath, and fleshy-leaved plants in general, which if placed in paper in the state in which they have been gathered, will either part with their vitality so irregularly as to fall in pieces in drying, or so slowly as to render the operation very long and tedious. If such plants are plunged for an instant in boiling water, the inconveniences I have mentioned are entirely removed, and the process of drying will go on as rapidly and uniformly as in other plants; or if the papers in which they are first laid be made very hot, the same end will be attained. When the specimens have been properly prepared, the second operation is to place them between sheets of paper, under a gentle pressure, and, by successively shifting them from the paper which becomes damp to dry paper, to extract from them all their humidity, till they become in a fit state for laying by in the herbarium. For this purpose common brown paper is generally employed, and perhaps it is altogether the best; soft absorbent paper, such as blotting paper, loses its texture and becomes rotten so soon, as to be both too expensive and too perishable. The following is as little troublesome

a method of drying plants as any with which I am acquainted. Take separate sheets of small sized common stout brown paper: between the leaves of each sheet place your specimens compactly, so as to get them in as small a space as possible, without their pressing too much on each other; having filled a convenient number of sheets in this manner, place them between two stout pieces of brown paper boards, or what are called millboards, of the same size as the sheets, and tie the whole together tightly by means of leathern straps, or a strong cord. After the specimens have been thus pressed for a few hours, till the paper may be supposed to have absorbed a considerable portion of humidity from the plants, uncord the package, and strew the sheets over the floor of a room till the paper begins to become dried; then tie them together again as first directed, and repeat the operation of unpacking and repacking till the specimens are perfectly deprived of their moisture, when they may be placed in fresh paper, and laid by. It will be found, that in the process of drying, as thus directed, some kinds of plants will be fit for laying by much sooner than others; the parcels should therefore be examined from time to time, and the specimens selected as they become ready. If, as upon journeys in a wild country, there should be no convenience for spreading the sheets of paper upon a floor, the specimens should be packed as closely as possible in a bundle, which may be carried on the back, and they may be laid not only between the leaves of single sheets of paper, but between the sheets themselves. The nightly fires which are made upon such a journey will serve for drying the sheets of paper, in which the specimens may be immediately replaced. By transferring into a single spare sheet of dry paper the plants in the first sheet of damp paper, and then drying the damp sheet, and so on, a large collection of fresh specimens may be quickly shifted, and daily receive all requisite attention without difficulty or inconvenience. Specimens, when finally prepared, are usually of a uniform, more or less dark brown, colour; they should be quite flat, and will often become brittle, and to the eye of inexperienced persons very unlike what they were when fresh. I mention this in order to guard against the very common mistake of supposing that unless specimens retain their colours, or at least some portion of their beauty, they are use-

less. Even European plants, prepared by the most experienced collectors, can rarely be brought to preserve their colours; with tropical plants no such effect can possibly be anticipated. The object in preparing them is, by pressure, to make them capable of being retained between the leaves of a book, and, by drying, to arrive at a state in which they are no longer affected by the humidity of the atmosphere. In many cases both leaves and flowers become perfectly black; it frequently happens that the specimens fall in pieces at every joint; large fleshy flowers will shrivel into a third of their size, and the gayest variations of brilliant colouring will be converted into a uniform dull black or brown colour. But these alterations are of no importance; because, in whatever state the specimens may be, maceration in boiling water will restore their original forms; if they should have fallen in pieces, the scars upon the branches will indicate whence the parts have separated, and loss of colour does not interfere with subsequent investigation for the purposes of science. In sending specimens to England, it is necessary that very great care be taken to keep the case containing them in as dry a part of the ship as possible; and that the paper in which they are finally laid be not only dry, but either new, or at least not deprived of its texture by previous use. A single sheet of rotten paper will infect a whole bundle of fresh paper. If the collection is small, common wooden boxes answer every purpose for packing. But if it is so extensive as to render the stowing it in a good part of the ship inconvenient, the specimens, well secured in external coverings of paper, should be placed closely in casks, chased over with wood, some dry material being rammed in tightly between the cask and its case.—*From the Gardener's Chronicle, 6th August, 1842.*

On the Cultivation of Celery and Salsafy.

Celery.—The method of cultivating Celery in the garden of Mr. Douglas, of Washington, is quite different from the usual plan of growing it in single trenches. The system is, to prepare a bed about four feet wide, and of any length the ground will admit. In this bed the plants are set out, in rows about six inches apart, and six inches from plant to plant. This takes place the latter part

of July or first of August. As soon as the plants get well rooted and begin to grow, the operation of blanching commences, and the earth is filled in between the plants every fortnight, until they complete their growth. The object of this mode is principally to counteract the effects of dryness. When the earth is thrown up in single ridges, evaporation, under a hot sun, takes place much more rapidly than if there was a large body of earth, as in beds four feet wide. The consequence is, that the plants have a constant supply of moisture, and as ridges are formed between the beds, where the earth is thrown out, in all heavy rains the plants receive all the benefit of the rain; while, by the method of growing the plants in single rows, all the water is carried away from them into the hollows which are formed, as soon as the plants are earthed up above the surface of the soil.

Salsafy.—The seeds should be sown in April, in rows about ten inches apart, in good light rich soil, dug very deep so that the roots may penetrate the earth, and meet with no obstruction to make them crooked. Thin out the plants to the distance of four or six inches; give due attention during the season, and keep the beds clean by occasional hoeings between the rows and by hand-weeding, and the plants will make a good growth. In October, or early in November, the roots should be taken up, and housed in the cellar, precisely in the same manner as the Parsnep, and may be used from time to time as needed. We have left them out all winter, as they are as hardy as the Parsnep; and where there is a plentiful stock, one or two rows might remain until March or April, when the roots should be dug. There are various methods of cooking the roots; but one of the most simple is to boil them, then mash and form them into cakes, and fry them in butter. Served in this way, they resemble a real "native" oyster, challenging even the palate of a *grand gourmet* to detect the substitute, and are an excellent accompaniment to many dishes, particularly in the country, where oysters are a rare article at all times.—*Hove's Magazine*.

Monthly Proceedings of the Society

(Wednesday, the 14th December, 1842.)

The Hon'ble Sir J. P. Grant, President, in the Chair.

(TWENTY-TWO MEMBERS PRESENT.)

Members Elected

The Gentlemen proposed at the September Meeting were elected Members, viz :—

Captain Hamilton Vetch; Messrs. T. J. Finnie; E. McDonell; James Hill; Henry Brownlow; M. Shaw; R. P. Harrison; S. H. Robinson; A. Sevestre; and Baboo Ramnath Tagore.

Candidates for Election

The names of the following Gentlemen were submitted as Candidates for Election :—

Baboo Brijonauth Dhur, Merchant, Calcutta,—proposed by Mr. John Allan, seconded by Mr. Wm. Storm.

Henry Wilson, Esq. (4th Regt. N. I.) Bareilly,—proposed by Mr. G. Berford, seconded by Mr. Wm. Storm.

Edward Pickard, Esq., Bareilly,—proposed by Mr. John Donald, seconded by Mr. Byrne.

J. W. Carter, Esq., (Firm of Carter and Lake) Calcutta,—proposed by Mr. Wm. Storm, seconded by Mr. W. N. Hedger.

H. C. Watts, Esq., Collector of Assessment, Calcutta,—proposed by Mr. R. Molloy, seconded by Mr. R. J. Rose.

R. W. G. Frith, Esq., Indigo Planter,—proposed by Mr. F. R. Hampton, seconded by Dr. Mouat.

John Edward Becher, Esq., Sugar Planter, Tirhoot,—proposed by Col. Garstin, seconded by Mr. H. Colquhoun.

Captain Goodwyn, Engineers,—proposed by Colonel Garstin, seconded by Mr. Colquhoun.

H. W. Lake, Esq., (Firm of Carter and Lake) Calcutta,—proposed by Mr. Storm, seconded by Mr. Hedger.

Capt. E. Buckle, Asst. Adjts. General, Artillery,—proposed by Lieut. F. C. Burnett, seconded by Dr. Mouat.

R. H. Buckland, Esq., Secy. Assam Company,—proposed by Mr. James Hume, seconded by Dr. Mouat.

Presentations to the Library.

1. The four first numbers of the Ceylon Miscellany.—*Presented by Mr. C. K. Robison.*
2. The Planter's Journal, Nos. 12 to 24—*Presented by Mr G T. F. Speede.*
3. The Calcutta Literary Gleaner, Nos. 8, 9, and 10.—*Presented by the Proprietor.*

Museum and Garden.

1. Skin of a Thibetan Sheep.—*Presented by Major Jenkins.*

Major Jenkins states that this skin may be considered a fair specimen of the common Bootan breed; the flocks are said to be very numerous, but the jealousy of Chinese policy prevents an exchange of the products of that country for those of Assam.

In connection with the above note of Major Jenkins, the Deputy Secretary submitted a report, by Mr. Robert Smith, on the quality of this fleece, when it was agreed that the same should be transferred to the Committee of Papers for the next, or 5th No. of the Journal.

2. Loongee manufactured at Bhawulpore, from Cotton the produce of Mexican Seed.—*Presented by Lieutenant E. J. Robinson, Supt. of the Blutty Territory, on behalf of the Nawaub of Bhawulpore.*

In his letter transmitting this piece of cloth, Lieutenant Robinson states, that it was manufactured from the produce of the Mexican Seed, forwarded last year, by the Society, to Bhawulpore. The weavers in that country speak highly of the Cotton, which they assert produces far superior thread to that brought from Europe, of which they use much. Lieutenant Robinson adds, that the texture of this Loongee is far superior to any yet made in the Territory of the Nawaub, who, in consequence thereof, has commenced the cultivation of the Mexican Cotton on a large scale.

This cloth was much admired by the members, for the fineness and softness of its texture.

3. A few Potatoes, as a specimen of last year's growth (during the rainy season) at Chickulda, near Gavalghur, in the neighbourhood of Ellichpore.—*Presented by Major George Twemlow.*

4. An assortment of French Garden and Flower Seeds, and Seeds of Pasture, Hay, and Cereal Grasses.—*Forwarded by Dr. Royle by the July, Sept. and Oct. Overland Mails, from the India House.*

The Deputy Secretary intimated, that he had distributed the Garden and Flower Seeds, as widely as possible. A large portion of the Grass and Grain Seeds is still available to Members.

5. A small assortment of Bulbous and Tuberous Roots, consisting of Tulips, Crocus, Ranunculus, Anemone, &c. —*Forwarded by Dr. Royle, by the Oct. Overland Mail.*

6. Sample of Cotton grown at Coimbatore from New Orleans Seed.—*Presented by Dr. Robert Wight.*

Dr. Wight mentions, that this Cotton was grown on the red soil of Coimbatore, and that a sample sent by him to England, has been most favourably reported on; for, in a communication to his address, Dr. Royle says, "I am happy to inform you, that your New Orleans Cotton grown on the red soil is pronounced by the best judges in Manchester, to be quite equal to the finest qualities of the same kind of Cotton from America.

7. A few Potatoes, as a specimen of the produce of his garden at Darjeeling.—*Forwarded by Dr. Campbell.*

Dr. Campbell states that six Potatoes, taken from his garden with many smaller ones, from two plants, weighed nearly seven pounds.

The Deputy Secretary mentioned that the Potatoes arrived in too decomposed a state for presentation at the meeting; they appeared to have been of more than ordinary size.

8. An American Hand Cotton Saw Gin.—*Presented by Mr. A. W. Woods, on behalf of the Braintree Manufacturing Company at Massachusetts.*

In his letter presenting this Machine, Mr. Woods states, that it was sent to him with a view of bringing it into greater notice, and for the purpose of determining whether it could be successfully used in India; he thinks he cannot better meet the wishes of the owners, in this respect, than by placing the Machine at the disposal of the Society.

It was resolved, that the best thanks of the Society be offered to Mr. Woods, and that he be addressed to the effect, that the Society will use its best endeavours to draw attention to the capabilities of the Machine.

9. Specimens of Cotton grown at Jaffna from Sea Island, Upland Georgia, Timnevelly, and Bourbon Seed. A specimen of "Plantation," or private growth Coffee; a specimen of Sugar; and a few plants of the "green Pine Apple" of Ceylon.—*Presented by Mr. C. K. Robison.*

Mr. Robison mentions, that having observed in the fourth, or last published number of the Society's Journal, a suggestion that the Coffee cultivation should be introduced in the Rajmahal Hills, and other high grounds, he desires to bring to the notice of the Society, that from all he has heard and seen at Ceylon, from whence he has just returned, he conceives that the localities indicated in the Journal would prove favourable to the growth of this staple.

Disposal of Motions

Tribute of respect to the Memory of the late Secretary.

The motion of which notice was given by Dr. Corbyn at the September Meeting of the Society, to the effect, "that as a mark of the deep sense this Society entertain of the valuable exertions and zeal of their late Secretary, Dr. Spry, a Gold Medal, to be entitled the '*Spry Medal*,' shall be given to such persons who may emulate his bright example for zeal in developing the Agricultural resources of India," was postponed, owing to the absence of the mover.

Consolidated Subscriptions.

The motion of which notice was given by Mr. Hume at the October Meeting, "that the subscriptions already compounded for, under Article V. of Regulations, March 11th 1835, remain unaffected by the additional subscription decided upon this day," was then read, —supported by the mover, and unanimously agreed to.

Subscription to New Journal.

The next motion submitted, of which notice had also been given at the October Meeting, was, "that the Journal be open to the

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public, at an annual subscription of sixteen rupees, and for a single number, one rupee eight annas." Mr. J. W. Roberts as proposer, and Mr. Hume as seconder of the motion, each said a few words in support thereof, when it was put to the vote, and carried.

Votes of Absent Members.

The last motion which was submitted, was that of which notice had been given at the November Meeting by Mr. Wale Byrne, seconded by Mr. R. Scott Thomson, viz: "that the votes of absent members for the Secretaryship tendered in writing, be accepted." In the absence of the mover and seconder, Mr. Kirkpatrick adopted and Mr. Heatly seconded the motion.

Mr. Hume addressed the meeting against the motion, Messrs. Kirkpatrick and Piddington in its support. Dr. Mouat added a few words in favour of the arguments adduced by Mr. Hume. The question was then put, and the motion was negatived.

Notice of Motion.

Mr. Hume gave the following notice of motion for consideration at the next Meeting:—

"That the question of amount from this Society's funds paid to the Secretariat Department be re-opened, with a view of reducing it to an amount more in keeping with the means of this Society."

Withdrawal by Government of privilege of free Postage to the Society.

The Hon'ble the President stated, that in accordance with the request of the Society made at the Special Meeting of the 5th October, he had addressed the Government regarding the late suspension of the privilege of free postage for the Journal and correspondence of the Society. He felt great regret and disappointment at the reply which he had received to his application: and which he would now read to the meeting.

Proceedings of the Society.

TO SIR J. P. GRANT, KT.

President of the Agricultural and Horticultural Society of India.

General Department.

HON'BLE SIR,—I am directed by the Honorable the President in Council to acknowledge the receipt of your letter dated the 21st ultimo, soliciting on behalf of the Agricultural and Horticultural Society, the withdrawal of the suspension of the privilege formerly conceded to it of forwarding free of Postage and Banghy-hire, all the Society's communications, printed transactions, and parcels of seed: etc. to the Members and Friends of the Institution.

2. I am desired to explain, that in consequence of the Monthly Journal of the Agricultural and Horticultural Society being a property yielding pecuniary return formerly to the Secretary, and now to the Society, and the number of pamphlets, letters, packets, and communications required by the Society to be forwarded free postage, averaging several hundreds per mensem, it became necessary to restrict the public frank to the bona fide correspondence of the Society, and to packages of seeds despatched to the Members of the Institution and to Superintendents of Plantations. But adverted to the various religious, scientific, literary, and charitable Societies existing at the Presidency, some of which have been allowed the indulgence, which has been refused to others, of sending their communications and circulating their proceedings free of postage, the Hon'ble the President in Council finds it difficult to prescribe any limit to that indulgence founded on a clear distinction of the relative claims of these Societies to an exemption from the charge of postage on account of the benefits which they confer upon the community, and is incumbent on the Government to protect the Post Office Revenue (already inadequate to the charges of the department) from being burdened by a general concession of the indulgence now solicited by the Agricultural and Horticultural Society.

3. The Post Office Rules contemplate the use of the public frank for such occasional letters or parcels or reports of proceedings of Societies as may be permitted to forward under any peculiar circumstances, free of postage. His Honor in Council has been directed

Proceedings of the Society,

pleased to determine that no periodicals, pamphlets, or printed papers, bills or subscription accounts of any Public Society, shall in future be allowed ordinarily to pass free of charge, and that the public frank for the use of any Society shall be confined to special cases in which the Secretary may deem the indulgence to be fairly claimable on public grounds; and exclusive of to the letter dāk.

4. The above rule will supersede all previous orders of Government under which correspondents of Public Societies have hitherto forwarded their letters and parcels on the affairs of such Societies under cover to the Secretary to Government in this department, free of postage. His Honor in Council cannot suppose that the payment of a trifling postage will prove onerous to any person interested in the furtherance of the objects of the Society with which he may be connected, and who may be furnished gratuitously with the record of proceedings of such Society.

5. The Hon'ble the President in Council regrets, that he cannot permit any longer the transmission by Dāk Banghy of parcels and packages, free of cost to the Society and its correspondents. Such an arrangement is attended with considerable expense to the State, and he has been obliged to prohibit the practice in regard to another Public Society at the Presidency which heretofore has enjoyed it.

6. Letters and parcels intended for the Hon'ble the Court of Directors will form exceptions to the above rules.

I have the honor to be, Hon'ble Sir,

Your most obedient humble Servant,

*Council Chamber,
The 16th November, 1842.*

*G. A. BUSHBY,
Secretary to the Govt. of India.*

In connection with the subject, the President next read the following Report of the Finance Committee:—

Report of the Finance Committee on the withdrawal by Government of the privilege of free postage for the Society's Journal and Correspondence.

The reply, from Government to the Society's application, that the privilege of free postage for its Journal and correspondence might be re-granted, having been unfavourable, and the same having been

submitted by the President of this Society to the Finance Committee, with a view of eliciting some Report on the pecuniary loss entailed in consequence thereof:—

Your Committee beg to report, that from an estimate carefully made by the Deputy Secretary, and which your Committee believe to be a fair one, it would appear, that taking the Mofussil subscribers to be (in round numbers) 300, the expense of postage on the Journal for the year would amount to Rs. 850, and that the postage on correspondence may be set down at Rs. 150, making together Rs. 1000 per annum.

Your Committee, after mature consideration, venture to recommend, that this sum, (or such as shall be necessary for this purpose,) be paid out of the Society's funds. They do this mainly on the ground that the subscription having been just raised 8 Rs. per annum, the infliction of postage, in addition, may materially interfere with the circulation of the Journal, and cause a decrease in the list of members. The Finance Committee consider the funds of the Society ill able to bear this outlay, but when they consider that the loss of only 26 members, in consequence of these additional charges, would be more than Rs. 1000 per annum, and that the loss of at least that number may be reasonably calculated upon, they choose, as they believe, the smaller of two evils, and they would submit, that as the estimated increase of income, owing to the additional subscriptions of Rs. 8 per annum, is Rs. 4000 per annum, it would be more prudent to devote a portion of that sum to the postage of the Journal, than to incur the risk above alluded to.

JAMES HUME,

Calcutta, December 12, 1842.

M. S. STAUNTON.

It was moved by Mr. Piddington, seconded by Dr. Mouat and resolved, that the Report of the Finance Committee be adopted.

The President intimated, that with the approbation of the Meeting, he would have the honour of transmitting a copy of this report to the Government, in order that it might know the extent of the loss the funds of the Society sustain by the withdrawal of the boon which they have so long enjoyed.

The President was unanimously requested by the Meeting to make such communication to the Government.

Society's Nursery Garden ; Completion of Bungalow ; Cane, Tobacco, and Mulberry Cultivation ; American Asparagus.

A Report from the Nursery Committee, of a meeting held at the Garden on the 31st October, was brought forward. The Committee states, that it proceeded, in the first instance to inspect the Bungalow which has recently been erected as a residence for the Overseer, it considers that the building has been completed in a very substantial manner, and at a moderate expense, the total cost, with the out-offices being 1,117 rupees. In consideration of the great assistance which has been afforded by the Head Overseer of the Botanic Garden in superintending the building, the Committee begs leave to recommend, that the sum of 100 Rs. be given to Mr. Dougherty, in testimony of the Society's approval of his services.

The Committee next proceeded to visit the Nursery. The Members regret to state, that in consequence of the late severe gale, the cane cultivation is in an unfavourable condition ; it is not probable that more than 15,000 canes will be available this season, for distribution. The Committee considers, that in consequence of the advanced state of the cultivation, no more time should be lost in cutting the cane, and it has accordingly directed, in anticipation of the Society's sanction, that the distribution should commence forthwith. The Committee is happy to report, that the Cuba and Bhilsa Tobacco cultivation is progressing favourably, a large supply of seed has already been gathered, and is in the course of distribution. A small piece of ground has been appropriated for the seedlings raised from the Gibali and Latakia Tobacco seed received from Mr. R. H. Potts ; the plants appear healthy, and are likely to yield a fair quantity of seed for future distribution.

The Committee states further, that since its last meeting, many cuttings have been supplied to Members of the Society and the public, from the *Morus Mauticaulis* cultivation, and several more plants are ready for distribution.

The Committee adds, with regret, the almost total failure of the *Asparagus* plants, raised from the stock which was transmitted from Boston, and presented to the Society by Mr. Tudor ; it suggests, in

conclusion, that the result of the supply forwarded to Allahabad, be ascertained.

The Deputy Secretary stated, that he had communicated to Mr. Lowther, the request of the Committee. A reply received a few days since from that gentleman, mentions, that the asparagus roots (which were forwarded to him by steamer,) had entirely failed, not a single root was in a state fit to be planted on the delivery of the box. Mr. Lowther adds, that this unfortunate result was a source of much regret to him, as he had prepared some ground for the reception of the plants, and from the result of previous experiments he was very sanguine of success.

Arrival of Fruit Trees from England, and arrangement for next year's consignment of Garden and Flower Seeds.

A second Report of the Nursery Committee, at a meeting held on the 22d-November, was next submitted. The Committee intimates the arrival of a small consignment of fruit trees from England, forwarded by Messrs. Loddiges of Hackney, consisting of pears, nectarines, apples, and plums, about one-half of the trees has reached in very good order; the Committee suggests that they be advertised for distribution to Members.

In the event of the Society determining that a further supply of fruit trees be obtained, the Committee desires to recommend that walnut, cherry, chestnut, almond, Spanish nut, and olive, be included. The Committee begs to suggest, that the best thanks of the Society be given to Dr. Royle, for the trouble he has so kindly taken in regard to this consignment.

The Committee states with regret, that from the unfavourable reports which have been received from Members in all parts of the country, it would appear, that the late supply of English seeds has proved as unsatisfactory as that of the former season, notwithstanding the care and attention bestowed by Dr. Royle on both consignments. Under these circumstances, the Committee recommends, that no further supply be indented from that quarter, but in lieu thereof, a larger quantity both of vegetable and flower seeds,

particularly the latter, be obtained from North America, and the Cape, and that the sum of Rs. 3,500 be voted for that purpose.

The Committee adds, that it has taken into consideration an offer made to the Society for the purchase of a small consignment of foreign hemp seed. With a view to meet the frequent demands of members, the Committee recommends the purchase of the seed, if obtainable, at a sum not exceeding 8 rupees per maund.

Suggestions for improving the Ferries of Bengal.

A letter was read from Dr. John McCosh at Cawnpore, presenting to the Society, an interesting paper containing suggestions for improving the Ferries of Bengal. Dr. McCosh states his opinion, that no class is more likely to appreciate the benefits of an improved system of ferrying than the Members of the Agricultural Society, many of whom, as practical Agriculturists, are in the daily habit of crossing rivers. He trusts, therefore, that these suggestions may be deemed worthy of the consideration of the Society.

The best thanks of the Society were directed to be offered to Dr. McCosh, and his communication was transferred to the Committee of Papers, for the Journal.

Reports from the Society of Arts on Samples of Assam Caoutchouc.

Two reports, lately received, on samples of Assam Caoutchouc transmitted by the Agricultural Society of India, for the opinion of the Committee of the Society of Arts, was next submitted.

In transmitting this communication, Mr. W. A. Graham, the Secretary, states, that the discrepancy between the two reports is accounted for, by the second examination having been made more than a year after the date of the first, and when the greater number of the samples were found adhering together in one mass, so that, when separated, several of the labels were destroyed.

The Reports were directed to be made over to the Committee of Papers, for publication in the Journal.

*Progress of Cotton Cultivation in the Government Experimental
Farms at Coimbatore.*

An interesting letter on the above subject from Dr. Wight, Superintendent Government Cotton Farms, was next submitted (See Correspondence and Selections, page 2.)

*Successful introduction at Kaira, of the Olive and Momordica
Elaterium.*

In a letter to the address of the late Secretary, Dr. Gibson communicates the pleasing intelligence of his success in rearing the olive tree at Kaira: he states, that since he last addressed the Society on the subject, he has had several importations of the olive trees by the overland route, so that he has now three species, the box leaved, the bread leaved, and the redoute. Of the first and third, Dr. Gibson mentions, he has many plants, one flourishing tree, ten feet high, and another six feet. The soil at Dapooree, which is a poor black, Dr. Gibson states, does not suit this or any other exotic tree well, but the soil at Kaira is very superior for trees. Dr. Gibson further mentions, that after 2½ years very careful nursing, it having repeatedly died down, the Momordica Elaterium seems at last to be ripening its fruit.

For the olives, Dr. Gibson states, he is indebted to the indefatigable exertions and kindness of the Messrs. Loddiges, and of Col. Jervis of the Bombay Engineers; for the seed of the Elaterium to Dr. C. Lush.

Dr. Gibson adds, in conclusion, that he will prepare some cuttings of the olive, for transmission to the Society.

*On the Cultivation of the Potatoe, and other farinaceus roots in
the neighbourhood of Ellichpore.*

A communication from Major Twemlow on the culture of the Potatoe, etc. at Ellichpore, was then read to the meeting. (See Correspondence and Selections, page 1.)

*Extended cultivation of the Aloe Plant in the District
of Bolundshehur*

The next communication submitted to the meeting was a long and interesting letter from Mr. Tonnochy, the Deputy Collector at Bolundshehur. (See Correspondence and Selections, page 3)

Applications for Cereal Grains, Cotton, and Hemp Seed.

Letters were read from Sir C. M. Wade,* the Resident at Indore, and from the Secretary of the Agra Local Agency Committee, applying for various agricultural seeds, for trial in their respective Districts

Mr. Reid, the Secretary of the Local Agency Committee at Agra, intimates his desire to introduce into the districts superior sorts of oats, barley, and other corns, obtained from Europe, the Cape and other parts; and requests the assistance of the Society to enable it to carry its wishes into effect

Proposed Cultivation of the Otaheite Cane and of Flax at Madras.

Capt. George McKenzie, Secretary of the Agricultural Society of Madras, intimates, that the perusal of the report of the Flax Committee of the Agricultural Society of India, as published in its proceedings for November 1841, has excited a feeling of emulation at Madras, and that it is the intention of their Society to attempt the cultivation of flax of the finer sorts in some of the Provinces of the Presidency. Capt. McKenzie states the wish of the Society to obtain from the Agricultural Society of India, such quantity of foreign and country flax seed, as is available, either for payment, or as a donation. Capt. McKenzie further mentions, that the success which has attended the cultivation of the Otaheite cane in Bengal, has induced several persons at the Madras Presidency to apply to their Society, but having only a nursery of the Mauritius

* For this letter, see Correspondence and Selections, page 4

cane, they are prevented from complying with these requisitions; they are consequently desirous of obtaining a quantity of this variety of cane from the Agricultural Society of India, to form a nursery in their own garden for future distribution.

The Deputy Secretary informed the members, that he had lost no time in meeting, as far as possible, the requests conveyed in the letters of Sir C. M. Wade and Mr. Reid. The expected arrival of the *Hindoostan*, with an assortment of hemp, barley, wheat and flax seed, which had been kindly forwarded by Dr. Royle, and the purchase of the hemp seed recommended in the report of the Nursery Committee, would admit of further supplies being sent to Indore and Agra, as well as a portion of the flax seed to Madras.

The Meeting coincided in this suggestion; and it was further resolved, that a supply of Otaheite cane should be forwarded to Madras.

Letters were read from Col. Sykes and Mr. H. C. Tucker, to the address of the late Secretary; both communications commendatory of the useful labours of the Society, with general observations on the culture of various Indian staples, and the present state of tree plantation in the North Western Provinces.

The letters were transferred to the Committee of Papers.

For all the foregoing presentations and communications, the thanks of the Society were accorded.

Statement of Receipts and Disbursements of the Agricultural and Horticultural Society of India, from 1st January to 31st December, 1842.

RECEIPTS

From Members, Subscriptions collected during the year, ...	14,622	0	0
„ Government Annual Donation, ...	1,045	0	0
„ Ditto, Monthly Allowance for 12 months at 135-13-6 per month, ...	1,630	2	0
	<hr/>	2,675	2 0
„ Proceeds of surplus Cape Vegetable Seeds sold during the year, ...	294	0	0
„ Ditto, of Sugar-cane, delivered from the Nursery Garden, ...	596	2	6
„ Ditto, of copies of the Transactions of the Society, ...	56	0	3
„ Collectors of Arrah, Sarun and Behar, being the amount cost of 30 maunds of Carolina Paddy, purchased by the Society, on account of the Commissioner of Patna, ...	188	7	0
„ Dr J. A. Dunbar, being the amount deposited with the Society, on behalf of Mr H. C. Tucker, to be given to the owner of the largest Tree Plantation in the Upper Provinces, in the year 1842, ...	300	0	0
„ The Ryan Testamental Fund, being the amount paid on its account, &c. per contra, ...	47	8	0
„ Dwarkanauth Dhur, amount received from him on return of Bullion, purchased in November 1841, for the manufacture of gold and silver Medals, the bullion having proved unserviceable, ...	463	9	0
„ From the Bank of Bengal, as a loan ...	1,500	0	0
„ Accruals of interest on fixed assets, ...	66	12	10
	<hr/>	4,110	13 7
Total Receipts, ...	21,407	15	7
Balance, in the Bank of Bengal, on 31st December 1841, ...	1,430	4	2
Ditto, in the Savings' Bank, on ditto, ...	95	10	7
	<hr/>	1,525	14 9
Grand Total, Co's Rs ...	22,933	14	4

DISBURSEMENTS.

FOREIGN VEGETABLE SEEDS

By C. N. Villet, for Cape Seed, ...	1,570	0	0
„ Dr Royle, amount advanced to meet expense of English Vegetable Seeds, Fruit Trees, &c., ...	1,090	14	0
„ Dr Huffnagle, for American Seeds, ...	1,100	15	4
„ Rameemul Mallce for country seed, ...	1	8	0

AMERICAN COTTON SEED

„ Dr Huffnagle, for cotton seed, ...	770	4	4
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(CAROLINA PADDY).

„ Messrs. Haworth, Hardman & Co., for Carolina Paddy, purchased on account of the Society, ...	167	8	0
„ Do for do. on account of the Commissioner of Patna, ...	250	4	0
	<hr/>	4,951	5 8
Carried over,	4,951	5	8

Brought forward .. 4,951 ..

SOCIETY'S TRANSACTIONS, PROCEEDINGS, &c

By Baptist Mission Press, for printing the Proceedings of the Society from January 1811 to January 1812, and the Annual Report for 1810-41,	1,666	2	0
.. Ditto, for printing 500 copies of the seventh Volume of the Transactions of the Society,	1,072	14	0
.. Rushton & Co. for binding 500 copies of the eighth Volume of the Transactions,	367	8	0
.. Bishop's College Press, for printing, &c. 700 copies of a list of Members of the Society on the 1st January 1842,	122	0	0
.. Grindlay & Co, for custom's duty, &c, for clearing parcels containing copies of the Transactions of the Society sent in 1839, for presentation to several Societies,	6	13	6

PRINTING ACCOUNT

.. Sundry Parties for printing Receipts and Circular Letters on account of the Ryan Testimonial, and for Tickets and other Labels, &c.
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NEW JOURNAL ACCOUNT

.. Medical Journal Press, for printing Nos. 2 and 3 of the Journal,
.. Baptist Mission Press, for coloured Demy for covers for the Journal, .. .. .	..	..	..
.. Messrs! Rushton and Co., for 30 Reams of Demy Paper, for the Journal, .. .. .	..	..	..
.. Mr Ballin, for making a Copper Plate and striking off impressions for covers, .. .. .	..	..	..

ADVERTISEMENTS

.. Advertising in the public prints from the 1st December 1841 to 30th November 1842, Notice of meetings of the Society, Distribution of Seeds, Sugar-cane &c, offers of Premia, &c &c	645	13	8
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ESTABLISHMENT

.. Amount for Establishment, from 1st December 1841, to 30th November 1842,	3,918	0	0
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STATIONERY

.. Stationery for Office Books, and for use of the Office,	184	4	0
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LIBRARY

.. Books purchased during the year, on account of the Library	98	15	0
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OVERSEER'S BUNGALOW.

.. Amount paid for erecting a Bungalow at the Nursery Garden, as a residence for the Overseer,	1	117	1
.. .. .	11		

FREIGHT

.. Freight on boxes of Seeds, from England, America and Cape,	257	1	0
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Carried over, 17,190 4 0

Brought forward, 17,190 . . .

VISITED FUNI

By Amount paid to the Sub Treasurer, for the purchase of a Government Promissory Note, No 7702

„ Hamilton and Co, for gold and silver Medals manufactured, engraved on, &c. 757 9 9

PECUNIARY REWARDS

„ Prizes to Mallees, awarded at a exhibition held on the 20th January 1842, 215 0 0

„ The Hooghly Branch Society, annual amount, 50 0 0

„ James Colquhoun, Esq, for the best produce of imported Cattle, exhibited at the Cattle show held on the 1st February 1841, 250 0 0

„ W. Storm, Esq for the best imported woolled Merino Ram of 1840 exhibited at ditto, 200 0 0

„ Ditto, for the best pen of Merino Ewes, to the number of six, imported during 1840, 100 0 0

„ The Executors of the late Mr Edward Whyte, for the second best produce of imported Cattle, exhibited at ditto, 200 0 0

„ Mr Gordon Stewart, for the second best woolled Merino Ram imported in 1840, 150 0 0

Mr R Dougherty, Head Overseer of the Botanic Garden, for superintending the erection of the Bungalow at the Nursery Garden, 100 0 0

 1,265 0 0

„ Postage and Petty Expenses during the year, 388 4

„ Amount paid to extra Writers and Packermen for subdividing consignments of Cape, American and English Seeds, 78 12 6

„ Ditto, to Writers employed for sundry purposes, 3 8 0

„ Custom House Duty on brown packing paper, 1 9 3

„ A Cash Box, 3 0 0

 479 2 3

NURSERY GARDEN

„ Expenses incurred on account of the Nursery, from the 1st December 1841 to 30th November 1842, 1,927 5 0

Total Disbursements, Co's Rs. 22,219 5 0

Balance in the Bank of Bengal on 31st December 1842, 554 1 11

Ditto, in the hand of the Government Agent on ditto, 160 7 5

 714 9 4

Grand Total, Co's Rs. 22,933 14 4 .

MEMORANDUM.

DISBURSEMENTS.

To amount of Disbursements during the year 1842.
as per Statement, 22,219 5 0
To Balance in the Bank of Bengal on the 31st December 1842, 534 1 11
" Ditto, in the hands of the Government Agent, on 31st December 1842, 160 7 5

Total, Co.'s Rs. 22,933 14 4

DEPENDENCIES.

Amount invested in Government Securities, lodged in the Government Agency Office, 8,300 0 0
Amount lodged in the Bank of Bengal, in satisfaction for a Loan of 1,500 Rs., 2 Notes for Sa Rs 1,000 each, 2,000, or Co.'s Rs 2,173 5 4

Amount of Subscriptions in arrear. 7,346 14 0

Total Co.'s Rs. 17,789 3 4

RECEIPTS.

By amount of Receipts during the year 1842 as per Statement, 21,407 15 7
By Balance in the Bank of Bengal, on the 31st December 1841, 1,430 4 2
By Ditto in the Savings' Bank, on ditto, 95 10 7

Total, Co.'s Rs. 22,933 14 4

LIABILITIES.

Amount due by the Society, for expenses incurred for printing, and a Loan from the Bank of Bengal of 1,500 Rs. &c. &c. 3,818 10 0
Amount for Prizes, for Cattle, &c. &c. for which the Society is engaged, 4,172 0 0

Total, Co.'s Rs. 7,990 10 0

Calcutta, for the Month of November 1842

The Observations after Sunset are made at the Hon'ble Company's Dispensary.

Observed at 9 h. 50 m.				Observed at 4 P. M.				Rain Gauges				Observations made at 8 P. M.				Observations made at 10 P. M.			
Moon's Changes		Temperature.		Wind		Barometer.		Temperature.		Wind		Barometer.		Temperature.		Wind			
		Of the Mer.	Of the Air	Of the Air	Of the Air	Of the Mer.	Of the Air	Of the Mer.	Of the Air	Of the Mer.	Of the Air	Of the Mer.	Of the Air	Of the Mer.	Of the Air	Of the Mer.	Of the Air		
Inches	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°		
1	23.889	80.8	81.7	78.0	S.	29.818	82.4	88.5	81.2	N.	W.	30.000	81.1	81.1	81.1	87.0	87.0		
2	8.1	81.0	84.0	77.0	W.	81.0	83.0	86.0	79.3	N.	W.	30.000	81.0	81.0	81.0	79.5	79.5		
3	8.73	80.5	83.8	74.6	N.	81.8	81.0	84.0	74.0	N.	E.	30.000	80.0	80.0	77.0	75.5	75.5		
4	9.03	78.5	81.0	72.8	N.	82.9	79.5	82.0	71.4	N.	W.	30.000	77.2	77.2	77.0	75.5	75.5		
5	8.81	76.5	78.0	70.6	N.	82.2	78.0	80.0	71.4	N.	W.	30.000	77.2	77.2	77.0	75.5	75.5		
6	8.59	76.2	78.1	71.0	N.	82.2	78.0	80.0	71.4	N.	W.	30.000	77.2	77.2	77.0	75.5	75.5		
7	8.62	76.2	78.1	71.0	N.	82.2	78.0	80.0	71.4	N.	W.	30.000	77.2	77.2	77.0	75.5	75.5		
8	8.62	76.2	78.1	71.0	N.	82.2	78.0	80.0	71.4	N.	W.	30.000	77.2	77.2	77.0	75.5	75.5		
9	8.62	76.2	78.1	71.0	N.	82.2	78.0	80.0	71.4	N.	W.	30.000	77.2	77.2	77.0	75.5	75.5		
0	8.57	77.0	81.2	73.0	N.	80.5	80.8	83.8	75.9	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
1	8.54	77.2	82.0	76.0	N.	79.0	80.5	83.0	77.0	E.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
2	8.65	78.5	82.0	76.1	N.	80.0	80.4	83.2	77.5	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
3	8.64	78.0	81.0	74.7	N.	82.5	76.5	84.0	76.8	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
4	8.63	77.0	81.5	74.3	N.	83.0	77.0	84.0	75.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
5	8.46	77.8	81.9	74.0	E.	87.7	79.5	84.0	75.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
6	9.70	76.8	78.2	72.0	N.	88.0	78.0	84.0	76.0	W.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
7	9.65	77.0	81.0	74.3	W.	88.5	78.0	84.0	76.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
8	9.73	77.0	79.6	72.2	W.	88.2	78.0	84.0	76.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
9	9.22	76.0	78.8	72.0	N.	84.6	78.0	84.0	76.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
0	9.65	76.8	80.2	72.5	E.	86.9	78.0	84.0	76.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
1	9.53	76.0	79.0	71.3	N.	86.9	78.2	81.0	71.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
2	9.46	73.2	77.0	70.0	N.	87.5	76.6	80.0	71.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
3	9.78	73.4	77.5	70.8	N.	86.6	76.6	80.2	72.2	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
4	9.26	74.6	78.3	71.2	N.	84.5	77.4	80.8	73.4	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
5	8.90	74.5	77.9	70.4	E.	83.0	76.9	80.4	74.3	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
6	8.89	74.0	77.2	71.0	N.	82.5	77.0	80.8	73.2	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
7	8.89	74.0	77.2	71.0	N.	82.5	77.0	80.8	73.2	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		
8	8.97	72.2	75.3	68.5	N.	83.8	75.8	79.8	69.0	N.	W.	30.000	77.0	77.0	77.0	75.5	75.5		

Observed at 9 A. 50 M.

Observed at 4 P. M.

Rain Gauge.

Observations, made at 8 P. M.

Observations made at 10 P. M.

Moon's Change.

Temperature.

Temperature.

Temperature.

Temperature.

Barometer.

Barometer.

Barometer.

Barometer.

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B. From a comparison of the two Barometers, the Mercury is said at the Observatory, standard, to be at least higher than that in use at the Surveyor General's Office.

Correspondence and Selections.

OBSERVATIONS ON THE POLICY OF THE INDIAN GOVERNMENT IN
REFERENCE TO THE AGRICULTURAL RESOURCES OF THE COUNTRY.

Extract of letter from COL. SYKES, dated India House, 30th September, 1842, to the address of the late Dr. SPRY.

“ Your Society is evidently flourishing, and long may it continue to do so. The rapidity of its progress, however, in usefulness, it is to be feared, will be checked by the necessity which exists for appropriating those funds to the unhappy Affghan war, which should be annually and perseveringly devoted to internal improvements in India. By extended means of irrigation, and by increased facilities for transit by means of roads and bridges, and by a judicious system of premiums, both Zemindar and Ryot would be more able and willing to engage in, and to carry out, the objects of the Agricultural Society than at present. But it is not the Agricultural Society, or the means of irrigation, or roads, or bridges, or premiums, that can permanently and efficiently stimulate the husbandman to devote more than his usual sluggish labor to the soil. He must be assured, that he alone shall reap the profits of the skill and little capital devoted to his land, without Government stepping in annually to take a per-centage share of his profits. I am happy to think, that a really sound view of the principles of assessment is gaining ground in the Court of Directors. Waste lands to the amount of some hundred thousand acres, have been granted in Goruckpore and the Deyrah Dhoon, on leases of 50 years, and Collectors in settled land are permitted to fix the assessments according to circumstances, and a compliance with the wishes of the Landholder, for periods varying from five to thirty years. The difficulty is to get the impoverished hand-to-mouth Ryot, to bind himself for any lengthened time; his fears counterbalancing his convictions, that in favorable seasons the more labor and the more capital he could bestow upon his land, the more profit he would reap from it. But then in bad seasons, he has doubts, whether he would obtain the

remissions which are now so liberally granted; and in the conflict of wishes and fears, he dares not accept a boon even. A Government to be rich, must have, if not a wealthy population, at least a population in easy circumstances, and with the means of extensively consuming exciseable articles. So long therefore as the necessity exists for making annual advances to the cultivator in the shape of *tucaree**, which is most extensively done at all the presidencies, to enable the Ryot to till his lands for the following year, so long will all praise-worthy attempts by Societies like yours, and other patriotic bodies, or by benevolent individuals, be neutralized, or rendered comparatively ineffective. It is apparently a hopeless prospect to convert a pauper peasantry into the possessors of little capitals, yet *I will hope*, that fixed moderate assessment, Government parental stimulus, and supervision, aided by the labors of Societies, may effect that change, which would make a Government and a people, wealthy. The change would be next thing to a miracle certainly, and when we reflect upon the fearful annual tribute India has to pay to England, a political economist might well despair. With reference to this matter, I fear the difference of opinion between Sir J. P. Grant and myself is not likely to be removed. It is imperative upon India to transmit to England annually 3,000,000*l.* sterling, whatever the state of the commercial relations may be between the countries. *It must be done*; whether the exchange be for or against; whether the commercial community would rather have money in England than in India; the Indian Government *must* send its three millions to England. Bullion would be exhausted in two or three years, and the gigantic evil can only be mitigated by the transmission of Indian products direct to England, or through China, or other countries. Horticultural products will give but small aid in such an undertaking, and I am quite willing to admit, that with a strong unnatural stimulus applied to the raising of exportable articles, the slightest check to manufacturing industry in Europe would render unavailing any such stimulus; but it is only by the products of India the tribute can be paid; and to these products the attention of the Agricultural Society, as a patriotic body, I humbly conceive, should be *primarily*

* Every description of vegetables.—ED.

directed; but not to the exclusion of affording the Ryot the means of regaling himself upon cabbages, cauliflowers, and potatoes, if he prefer them to his sukkurkund, brinjal, and fifty varieties of *bajee*! The parallel drawn between the horticultural wants of England in Elizabeth's time, and the horticultural wants of India in present days, cannot hold good. England had its indigenous sorrel, parsnip, asparagus, and carrot, only to boast of; the two last, fibrous and barely edible weeds. To England, therefore, every horticultural product was an inestimable boon. How different the case with India! I do not believe one European in fifty is aware of the number and variety of the vegetables and fruits which its fertile soil yields; yet from lists before me, I could say, that they exceed in number the products of Europe, and there is nothing in Europe available to the population at large, comparable with the mango—the grapes of Italy, Spain, and the South of France probably excepted. Every new vegetable or fruit therefore introduced into India is not the supply of an urgent want, as was the case with cabbages and potatoes, when brought into England; but it may be freely granted, that such introduction gives additional means of enjoyment, and is desirable, provided it be not at a cost, that would paralyse more enlarged and statesman-like projects. I have seen the advertisements of the Society respecting the distribution of mulberry cuttings, sugar canes, Carolina rice, etc. etc., and feel satisfied, that in such measures, it is conferring a blessing upon the country, and establishing a strong claim to the gratitude of the Government.”

FURTHER EXPERIMENTS IN REELING THE SILK FROM THE COCOON
OF THE ERI WORM:

*In a letter from Mr. GEORGE EVELEIGH, dated Calcutta,
8th February, 1843.*

“I beg to send you enclosed a specimen of Erie Silk, which I have wound from two cocoons. I should have sent a larger sample, but my time has been too much occupied to allow of my doing it for the present occasion. Although I believe it will not be found worthy

either the prize or the medal offered for the improvement of the Erie Silk, yet I trust it will not be found unworthy the attention of the Society, being, I believe, the best sample yet produced. My mode of winding has been simply that of placing the cocoon in lukewarm water, although I found in some other experiments that ammonia in solution was a perfect menstruum for dissolving the resinous quality of the silk, but it appears to injure the silk itself. The mode of improvement I have now adopted is, that of feeding the worms occasionally (as they would not bear it permanently) on mulberry leaves, and of giving them the leaves at all times in as moist a state as possible, by dipping them in water at the time of feeding the worms, and two or three times a day, sprinkling it over the leaves while the worms are on them; this appears much to increase the growth of the worms, which in the present instance have obtained a larger size than I have ever seen them before, and the silk appears greatly improved, both in quantity and quality; and there appears to be a less deposit of the resinous matter on the silk, which is therefore more easily wound off. I beg also to propose crossing the breed of the Erie moths with those of the common ones, and then feeding them entirely on mulberry leaves. I believe that in this manner the finest and best silk might be obtained, and that it would be wound with the greatest facility. The plan of the wet leaves was suggested to me, by finding the worms always go from the dry to the wet ones. The present worms I was furnished with, through the kindness of the Deputy Secretary."

*
REMARKS ON THE CULTIVATION OF TENNESSEE COTTON, IN THE
NEIGHBOURHOOD OF CALCUTTA :

In a letter from Mr. G. T. F. SPEEDE, dated Calcutta, 8th February, 1843.

"The accompanying few pods of Cotton, are the first that have ripened on a few trees, the produce of Tennessee seed received from the Society, and put into the ground last rains. The condition of these pods is injured by having been left too long on the tree, and also in some measure by the rain falling as they were ripening; but it will still shew that this Cotton is well worthy of attention."

I have observed that the shrub has a natural tendency to run up a weak, lanky, leading shoot, bearing small unhealthy pods, subject in that sickly state to the attacks of a red beetle and scarlet aphid; but that if the plant is headed down, it assumes a different form very readily, and throws out strong healthy arms, laterally covered with fine pods, which promise well. It is principally on account of this observation of its habit that I bring the subject to the notice of the Society, as not only does this head-pruning improve the healthiness and prolific quality of the plant, but those which are so treated, cease to be infested by the insects I have referred to; except so far as an occasional straggler may reach them from their more sickly neighbours.

"The soil my plants are in, is a fair alluvial loam, naturally subject to inundation, but now defended by embankments, and situate on the Baloo Khal. The being unable to pay it more than a weekly visit, has of course prevented that attention the plants would, under other circumstances, have received."

On the Azotized Nutritive Principles of Plants. By Professor
LIEBIG*.

[From the *Annalen der Chemie und Pharmacie*, August, 1841.]

The vegetable kingdom contains many azotized compounds of various characters, existing as component parts of plants. Many of these compounds are peculiar to certain genera of plants; some are found in species only, and not in every individual species of the same family; others in two or more species of different families. They are in general remarkable for their peculiar action on the animal organization; this action is poisonous, or, what is commonly called medicinal; but they are found only in minute quantity in the fruit, leaves, or roots of the plants in which they exist. All organic bases such as caffeine, asparagin, and piperin, belong to this class of bodies. They appear to be incapable of replacing the loss of matter sustained in animals by the action of the vital process, or of increasing in a perceptible degree the size of any organ, partly for this reason,

Translated by Robert Smith, Ph. D.

and partly because those matters, which serve as nourishment are wanting in them; and they are eaten in very small quantities only. they cannot be considered as nutriment.

But there is another class of azotized compounds most extensively diffused, although their number is small; one of these three or four substances appears in all plants without exception, the other three are found only as ingredients, in certain families. These three substances, namely vegetable albumen, gluten, and legumin, are, properly speaking, the azotized nutritive principles of plants.

Vegetable albumen, which is distinguished by its solubility in water, is found in the juices of plants, but chiefly in oleaginous seeds.

Gluten is one of the chief ingredients of the seeds of the cereals, legumin is found in leguminous plants, chiefly in beans, peas, and lentils. These, with another substance, which I shall call vegetable fibrin, form the proper nutriment of graminivorous animals, from which their blood is produced, and from which all the azotized portions of their bodies take their rise. It is in the vegetable kingdom that the nourishment of animals in general is prepared; for, strictly speaking, carnivorous animals, when they consume other animals which have fed on vegetables, consume only the vegetable principles which have served the latter as nourishment. Every azotized animal substance has consequently its origin in plants.

It is well known that carnivorous and graminivorous animals have very different digestive organs, but that the assimilation is performed in both by the blood; the comparison becomes therefore a most important subject for the physiologist.

In carnivorous animals the process of nutrition is very simple. the nourishment they take is identically the same as the principal component parts of their own bodies: the flesh, blood, membranes, etc. which they consume, are in no respect different, chemically speaking, from their own flesh and blood. The food of carnivorous animals assumes a new form in the stomach and organs of digestion, but its chemical composition suffers no change; it is made soluble, and therefore becomes transferable to the different parts of the body, taking again the form of blood from which it originated. In that class of animals the vital action of the organs in digestion and the formation of blood, is confined to a mere change of the condition

Nutritive Principles of Plants.

of the nutritive matter, as it is all capable of assimilation in the state in which it is taken; and such substances only pass unchanged through the alimentary canal, as the excess of inorganic substances in the food, and the earthy matter of the bones, with insoluble salts of magnesia. The process of nutrition in graminivorous animals appears much more complicated; their digestive organs are more complex, and their food has much less resemblance to the constituents of their bodies.

All those parts of plants which serve as nourishment to graminivorous animals contain, besides the azotized compounds named, certain others absolutely necessary for the support of life, which yet contain no nitrogen. These compounds, among which are sugar, amylin, and gum, are evidently applied to some particular purpose, as they disappear in the organization; they, no doubt, take a part in certain processes, which, in carnivorous animals, are conducted in a different manner.

Before being able to decide with certainty as to the part in the vital processes of animals, performed by the substances destitute of nitrogen, it is necessary to know the composition of those vegetable compounds which contain that element.

If it is found, on inquiry, that the composition of vegetable albumen, gluten, fibrin, and legumin, differs from that of the blood of animals, or from that of the albumen and fibrin which they contain, it is clear that the starch, sugar, and gum must give up some portion of their elements to compensate for the difference.

If it is found, for example, that vegetable albumen contains the same quantity of nitrogen as animal albumen, but a smaller proportion of carbon, or that vegetable fibrin contains less carbon than animal fibrin, the necessity would be clearly seen, of adding to these azotized vegetable substances the elements of such bodies as sugar, amylin, and gum, so as to compose animal albumen and fibrin; or, in other words, to form blood. If vegetable albumen and fibrin were deficient in carbon, this want would be found to be supplied by the sugar, gum, and starch; for it is remarkable that these latter bodies contain only carbon and the elements of water, and they would add nothing to the azotized compounds but that carbon in which they are supposed deficient. But if, on the other hand, it is proved that

the azotized nutritive principles of plants have the same composition as blood, or albumen and fibrin, then in whatever way the assimilation of the nutriment is conducted, it is clear that the carbon of starch and the other compounds destitute of nitrogen cannot possibly be consumed in the formation of blood. If vegetable albumen and fibrin possess the same proportion of carbon and nitrogen as the animal principles of the same name, the latter have no need of the carbon, of the sugar, or starch; as we cannot suppose that the one substance should give up a part of its carbon to receive an equal quantity of the same element from another substance; such an idea would refute itself. Thirdly, if azotized vegetable principles contain a greater proportion of carbon than the component parts of animals, to an equal proportion of nitrogen, then every probability at once ceases that sugar, gum, or starch should be used in the formation of the azotized animal compounds, or in supplying the place of what is consumed, because the azotized vegetable principles must lose their excess of carbon to become either blood or muscular fibre.

No organ employed in performing any vital function in animals, nor any essential constituent of such an organ, is destitute of nitrogen; the only animal substances indeed which do not contain that element, are water and fat, both without any distinct form, both without vital action, and serving only as connexions in the organization. Animals must receive as much nitrogen in their food, as is excreted and removed from the body by the decomposition of the organs; young animals must receive more, for the growth of these organs. When the proper quantity of nitrogen necessary for the reproduction of the decomposed parts is not found in the nutriment, the equilibrium is of course destroyed, the body can no longer grow, but must, on the contrary, decrease. Experiments have been made on the nutrition of animals, by means of sugar, gum, and starch, and it has been sufficiently proved that the vital action of animals is inadequate to the production of nitrogen, or any other element; for animals fed only with the nutriments mentioned invariably die of starvation.

The first case supposed above is the only one in which substances destitute of nitrogen can be of use in supplying the loss sustained in the organs of animals; namely, if the azotized principles of vege-

tables contain the same number of atoms of nitrogen, but a smaller proportion of carbon, than the blood and other component parts of animals. Then may sugar, and bodies of a similar composition, be available in the formation of the organism of animals, by imparting carbon.

Several talented and skilful chemists and physicians have devoted themselves, in this laboratory, during the past year, to the investigation of the composition of albumen, fibrin, the membranes, and gelatinous parts of animals, and the azotized compounds of vegetables. The preparation of the vegetable substances for analysis was undertaken by myself, and it is my object at present to communicate the principal conclusions of the whole inquiry.

Drs. Scherer and Jones will publish, in their own papers, a description of their experiments, with the more detailed results of their analyses; and I shall content myself at present with speaking only of their general relations, and of the results, which are independent of the per centage of the elements.

Fibrin, albumen, and casein, as they are found in nature, differ very much in their external properties and structure, and in their relations towards water and heat.

Fibrin derived from the blood is perfectly insoluble in cold water; the liquid albumen of the blood may be mixed with any quantity of water, and the albumen of the egg is soluble in water.

Fresh prepared fibrin has the form of transparent, soft, elastic threads, which are not at all glutinous, and cannot be united by kneading. When a solution of albumen is heated to a certain temperature, it coagulates into a white, soft, elastic mass, which cannot be kneaded. Albumen is not precipitated from its solution in water by acetic acid. The casein of the milk of animals, which is the chief nourishment of their young, is also distinguished from fibrin, by solubility in water. Heat does not coagulate the solution of casein like that of albumen, but a pellicle is formed by evaporation on the surface of the former solution, which, if removed, is continually renewed. Casein also is precipitated from solution by acetic acid, as a thick coherent mass or curd. Fibrin, albumen, and casein, comport themselves in the same manner with hydrochloric acid. They are dissolved by that acid with the aid of heat; and if the so-

lution is exposed to a somewhat high temperature for a length of time, it assumes first a beautiful lilac, and then a violet blue colour. At this point of the decomposition, carbonate of ammonia, and other re-agents, act in the same manner in all the three solutions.

Fibrin, albumen, and casein, possess the same composition, according to all the analyses hitherto made; and these analyses have been so often repeated, that no doubt can be entertained of the accuracy of the chief results. The proportion of organic elements being the same, they must be arranged in a different order, to account for the difference in properties of these principles. The gas obtained by burning any of these three substances with oxide of copper, in the ordinary process of analysis, is found to be a mixture of nitrogen and carbonic acid. When executed according to the qualitative method, in which relative quantities only are obtained, 8 volumes of the gas gave very nearly 7 volumes of carbonic acid, and 1 volume of nitrogen. When analysed so as to ascertain absolute quantities, or according to the new method of Drs. Will and Varentrapp, by estimating the ammonia obtained from them, the atomic proportion was found to be as 8 : 1; or these bodies give 8 volumes of carbonic acid to 1 volume of nitrogen.

The proportion of carbon obtained, when these substances are burnt with oxide of copper, is smaller, because it is difficult to cause them to undergo complete combustion; but if chromate of lead is used, in the place of oxide of copper, and due precautions taken, the analysis is much more accurate, and the quantity of carbon approaches nearer to that obtained by the direct methods. The dried flesh of animals, and the dried muscular fibre of the ox, freed from fat, give, when burnt with oxide of copper, 1 volume of nitrogen to 7 volumes of carbonic acid. The result is the same with pure albumen, burnt in the same manner. The muscular fibre of the ox and roe, boiled or roasted, blood dried at 212° , and the dried flesh of fish, such as pike and cod, which so much resembles coagulated albumen, all give the same proportions of gas—(Dr. Playfair). Proceeding, then, on the foundation which these experiments afford, to compare the composition of azotized vegetable substances with the principal component parts of animals, a most important fact is at once discovered, namely, that all those nutritive vegetable principles,

whatever they may be, possess either the same composition as fibrin, albumen, and casein, or, if the percentage be different, still have the same proportion of nitrogen and carbon as the animal substances possess. It is remarkable also that this resemblance goes still further, for these vegetable substances conduct themselves in a similar manner with chemical reagents, so that we may say that their form is merely changed, when animals produce blood and muscular fibre from them; for they are obtained from plants in a perfect state, as far as the proportion of their elements is concerned.

Graminivorous animals are fed on vegetable albumen, fibrin, and casein, which have therefore, chemically considered, the same composition, and in most cases the same properties, as their own blood, albumen, and muscular fibre.

The azotized principles of vegetables may be divided into three modifications, from their behaviour towards ammonia and acetic acid, at the ordinary temperature. I have given the name of *vegetable fibrin* to that ingredient of the cereals, of wheat, rye, barley, oats, buck-wheat, maize, and rice, which is insoluble in water and ammonia. It is not found in leguminous plants.

The name *vegetable albumen* is applied by me to that azotized ingredient of the juice or other parts of plants which is held in solution, or is soluble in water, and coagulates like animal albumen, when boiled, and is not precipitated from solution by acetic acid.

Vegetable casein is soluble in cold water: its solution does not coagulate. Acids cause a precipitate in its solution which is soluble in ammonia, but insoluble in dilute acetic acid.

Vegetable casein is obtained from leguminous plants, such as beans, peas, and lentils, in the following manner:—warm water is poured over them, and they are allowed to soften for some hours, until they can be rubbed in a mortar, to a syrupy consistence. Five or six volumes of water are then poured upon the mass, and the whole is thrown upon a fine sieve, through which the solution of vegetable casein flows, mixed with starch. It is now allowed to stand an hour, or two, till the starch is deposited.

The liquid which contains the vegetable casein in solution is then drawn off from the starch; it is not clear, but milky, and of a yellowish tinge. This cloudiness arises, partly from an admixture

of fatty or waxy substances, and partly from a continued precipitation of the vegetable casein; a few drops of ammonia make the liquid somewhat clearer.

The substance of leguminous plants, finely pulverized, and washed in cold water, has no action on vegetable colours; but if allowed to stand for some hours in water, it becomes slightly acid; this is the cause of the cloudiness of the last solution, and of the precipitation of the casein prepared from these plants. Boiling does not cause the slightest coagulation in the solution of vegetable casein; but a skin is formed on the surface of the liquid when evaporated, and is renewed as often as we remove it, exactly as in heated milk.

All acids, without exception, coagulate the solution; it becomes flocculent and of the consistence of jelly on the addition of acetic acid, which acid, even in excess, cannot dissolve coagulated vegetable casein. Tartaric and oxalic acid, in excess, dissolve the precipitates which they cause. Sulphuric and nitric acids precipitate the last solutions anew. The casein of milk comports itself exactly like vegetable casein; it is coagulated by acetic, tartaric, and oxalic acids, the precipitate is dissolved in an excess of the latter two, and reappears on adding sulphuric or hydrochloric acid.

An acid reaction is observable in all the precipitates of vegetable casein produced by acids; they are, in fact, compounds formed with the acids, and react in every respect as the corresponding combinations of the casein of milk. Alcohol also coagulates it as it does milk. When the solution of vegetable casein, as it is obtained from beans, peas, and lentils, is allowed to stand for twenty-four hours, at a temperature of from 60° to 70° Fahr., a gelatinous precipitate is formed, much resembling caseum. The supernatant liquid is of a greenish yellow colour, and has a decidedly acid reaction, a little gas is at the same time seen to escape. This acid is the lactic; for when it is evaporated with oxide of zinc, crystals are formed, possessing the characteristic insolubility of the lactate of zinc.

The coagulum is a lactate of vegetable casein; it has an acid reaction, and cannot be obtained otherwise by the longest washing with water or alcohol. The lactate of vegetable casein is very soluble in ammonia and the alkalies; alcohol and æther extract from it a green fatty matter. When an alkaline solution of vegetable

casein is kept boiling for some time with an excess of potash, the addition of dilute sulphuric acid causes a precipitate, and the escape of sulphuretted hydrogen. Vegetable casein conducts itself with the salts of the earths and metals, exactly like the casein of milk.

The sulphate of magnesia, the acetate, and other salts of lime, are not precipitated by an aqueous solution of pure animal casein, when cold; but the slightest heat causes immediate coagulation. Vegetable casein has the same properties; when it is dried and heated to redness, white alkaline ashes are obtained, which contain a great deal of potash, part of it united to phosphoric acid. The salts contained in vegetable casein, which are insoluble in water, are phosphates of magnesia, lime, and iron, as in the milk of animals. It is impossible to obtain this casein soluble in water by itself, by adding carbonate of lime or barytes to the sulphate, as it appears to enter into insoluble combinations with these two earths much more readily than animal casein.

The soluble animal casein, obtained according to the method described by Braconnot, is never free from some foreign matter; it possesses also in an equal degree the power of forming combinations; its solutions cannot be warmed with carbonate of lime or barytes without being decomposed, forming perfectly insoluble compounds, which become hard as a stone in the air.

The animal casein prepared by Berzelius contained 6.5 per cent. of foreign substances, such as phosphate of lime, magnesia, iron, and free lime, so that, strictly speaking, we are as little acquainted with a pure soluble animal as we are with a pure vegetable casein, free from bases or acids. In a word, it is impossible to find the slightest difference between the two bodies, either in composition or in their behaviour with reagents.

It is very remarkable that the identity of the two substances has hitherto escaped the attention of chemists, as Braconnot says in his treatise on the casein in the milk of animals (*Ann. de Chimie et de Physique*, xliii, p. 347): "I must confess, that in examining the seeds of the leguminous plants, before I was acquainted with the properties of casein, I fell into the error of describing legumin as a new and peculiar substance; at present it appears to me very much to resemble caseum."

Vegetable fibrin is an ingredient of the cereals, especially of wheat. It is found in combination with gluten when the dough of wheaten flour is kneaded, water being allowed to drop continually upon it. Vegetable albumen and starch are carried away by the water, and when this has taken place, or when the water ceases to be milky, a substance remains of a grayish white colour, tough, ductile, and perfectly insoluble in hot or cold water. The only difference between vegetable fibrin and albumen is this solubility in water. In this and in every other property it resembles animal fibrin obtained from arterial blood.

Vegetable albumen is obtained when the viscid part of wheaten flour is repeatedly washed with alcohol, till nothing more can be extracted; in this process the gluten is dissolved. When washed with alcohol, the first matter loses its viscid nature entirely. It is grayish white, soft and elastic, but not ductile as before, and is not free from starch and husks. When flour is mixed with water, dilute sulphuric acid added, and the whole kept warm until it is as liquid as water, the vegetable fibrin remains suspended in the liquid, in the form of a gray flocculent substance, which must be collected on a filter and washed with a weak solution of caustic potash. When carefully neutralized, a precipitate of vegetable fibrin and gluten is obtained, which alcohol will separate. Vegetable albumen is also contained in solution in the juices of plants, and may be extracted by cold water from corn and oily seeds. It is distinguished from vegetable casein by coagulating when heated, and by not being precipitated by acetic acid. When the solution of albumen is very dilute, the coagulum does not fall until the solution is evaporated.

The oily seeds contain vegetable casein and albumen in different proportions. When the concentrated milk of the seeds is mixed with æther free from alcohol and allowed to stand, two layers may be observed; the upper contains the oil, the under whatever is soluble in water. Boiling precipitates coagulated albumen from this aqueous solution; casein remains in the hot liquid, and may be removed by acetic acid. The albumen of sweet almonds is remarkable for its solubility, and for its property of causing the decomposition of amygdalin. When these almonds are well freed from oil by expression, treated with æther, and washed with cold water, acetic

acid throws down casein from the aqueous solution, leaving albumen. It was this property which induced Robiquet to give a peculiar name to the albumen from that source.

Coagulated vegetable albumen is obtained from sweet almonds, when they are peeled, grated, and boiled a few minutes in water, which removes the sugar, gum, and the chief part of the casein, then washed with æther to remove the oil. In all its properties, in all its combinations, and in its behaviour towards acids and alkalies, it resembles the coagulated white of the egg. When burnt, these almonds leave 3.17 per cent. of ashes, containing a great deal of carbonate of potash, besides phosphates of magnesia and lime, with traces of iron and alkaline phosphates.

The same salts are found in milk, and it is scarcely to be doubted that the potash in both is in combination with the casein and albumen. It is generally believed that the alkali of milk is in combination with lactic acid, but that acid has never been found in it when new. It is known that the acid in question begins to form as soon as milk leaves the udder, that it increases until the alkaline combinations are destroyed, and the consequence is coagulation, and the formation of lactate of casein, or cheese. Wheaten flour contains a considerable quantity of vegetable albumen, which may be extracted by cold water, and coagulated by boiling.

The juice of plants of every kind, when boiled, gives more or less coagulated albumen, of a gray or green colour; in most cases it is mixed with the green colouring matter of the leaves, and a colourless crystallizable fat or wax. There is a very great quantity of albumen in the juice of carrots, turnips, stalks of peas, cabbages, and garden vegetables in general.

Gluten is the name given to that part of the viscous matter of wheaten flour, which is soluble in alcohol. The alcohol is evaporated off, and the gluten remaining washed with hot water; it is a soft, yellowish mass, very viscous, and always somewhat acid in its action.

Gluten is a combination of casein; it is distinguished from vegetable fibrin by its solubility in boiling alcohol, and the ease with which it is dissolved at a common temperature in dilute ammonia. A few drops of acetic acid added to the saturated, boiling, ammoniacal solution cause a white coagulum to be formed before the neutral-

lization is effected; it cannot be distinguished from boiled caseum or coagulated white of egg. This precipitate contains ammonia in chemical combination; it may be removed by boiling in water acidulated with acetic acid, or by being well washed with water and dried.

When the viscous matter of wheat is rubbed with ammonia, vegetable fibrin remains, and a turbid solution of gluten is formed, which gives the same coagulum when acetic acid is added to it boiling: analysis proves it to have the same composition as albumen.

I will here give a comparative view of the composition of the azotized principles of Vegetable nutriment, and of Animal fibrin, albumen and casein.

Vegetable fibrin.

	I.	II.	III.
	Dr. H. B. Jones.	Dr. Scherer.	Dr. Scherer.
Carbon . . .	53.83	54.603	54.603
Nitrogen . . .	15.59	15.810	15.810
Hydrogen . . .	7.02	7.302	7.491
Oxygen . . .	23.56	22.285	22.096
Sulphur . . .			
Phosphorus . . .			

Vegetable Albumen.

	From Rye.	From Wheat.	From Gluten.
	Dr. Jones.		Drs. Will & Varrentrapp.
Carbon . . .	54.74	55.01	54.85
Nitrogen . . .	15.85	15.92	15.88
Hydrogen . . .	7.77	7.23	6.98
Oxygen . . .	21.64	21.84	22.39
Sulphur . . .			
Phosphorus . . .			

Vegetable Casein.

	Dr. Scherer.	Dr. Varrentrapp.
Carbon . . .	54.138	51.41
Nitrogen . . .	15.672	14.48
Hydrogen . . .	7.156	
Oxygen . . .	23.034	Sulphate (?)
Sulphur . . .		

C : N = 8 : 1

Gluten.

Dr. Jones.

	Impure	Purified with Ether.	Pure.
Carbon . . .	58.47	56.80	55.22
Nitrogen . . .			15.98
Hydrogen . . .	7.65	7.60	7.42
Oxygen . . .			21.38

To these analyses, which were made in this laboratory, I will add a few remarks.

From the results given, it is obvious that all these substances contain carbon and nitrogen in the same proportion.

Vegetable fibrin, albumen and casein, contain the same organic elements, and the composition is the same in all; viz. 8 equivalents of carbon to 1 of nitrogen. This proportion agrees exactly with that obtained by Mulder, as the composition of vegetable albumen. Marcet's analysis of the unwashed viscous matter of wheat gives a greater proportion of carbon; the analyses of vegetable albumen and gluten, by Boussingault, give a smaller. I will here give these analyses:—

Gluten of Wheat, not purified.

	Marcet.	Boussingault.
Carbon . . .	55.7	53.5
Nitrogen . . .	14.5	15.0
Hydrogen . . .	7.8	7.0
Oxygen . . .	22.0	24.5

Boussingault obtained impure gluten from the glutinous matter of wheat, by boiling it in alcohol and precipitating the solution by water. This was dissolved in acetic acid, and precipitated by carbonate of ammonia, for a second analysis. After abstracting the incombustible ingredients, the results are:—

	Washed out with Alcohol.	Dissolved in Acetic Acid.
Carbon : . .	54.2	52.3
Nitrogen . . .	13.9	18.9
Hydrogen . . .	7.5	6.5
Oxygen . . .	24.4	29.3

Vegetable albumen, that part of wheaten flour which is soluble in water, and is precipitated in a coagulum on being boiled and evaporated, was found to have the following composition, according to the same chemist :—

Carbon	52·7
Nitrogen	18·4
Hydrogen	6·9
Oxygen	22·0

The solution of gluten in acetic acid is turbid and mucous ; ammonia and its carbonate precipitate that solution white, long before the acetic acid is neutralized ; the matter is not glutinous in this state, but may be drawn out into threads. Mixed with it there is a substance resembling birdlime, which may be removed by æther. Boussingault neglected to use æther in purifying these substances ; but this cannot be the cause of the difference in the carbon. The numerous analyses which have been made here, prove that the difference lies partly in the difficulty of obtaining these substances in a fine powder after they are dried ; they are all tough and horny, and it is impossible to burn them completely with oxide of copper. It can only be done with the assistance of chlorate of potash, or by using chromate of lead. As to the greater proportion of nitrogen obtained by Boussingault, I must refer to what I have said at the beginning, that although the analyses with oxide of copper, according to the qualitative method, in the experiments of Drs. Will, Varrentrapp, Scherer, and Jones, did not give 18 per cent. of nitrogen ; they gave so much as 17, and 17·5, which is equal to 6·9, 7·0, 7·2, 7·3 of carbon to 1 of nitrogen. When chromate of lead was used, the proportion of 1 to 8 was found in the last tube of gas collected.

According to the quantitative method of analysis first described by myself, and followed by Mulder, the proportion was 8 equivalents of carbon to 1 of nitrogen. The same result was obtained, according to the new method of estimation, from the ammonia produced, which gives very accurate results. *Annalen* of Sept.* Gluten I consider to be a very variable ingredient of the flour of cereals, as rye, barley,

* See New Method of determining Nitrogen in Organic Compounds, by Drs. Will and Varrentrapp, in the *Phil. Mag.* for March 1842, p. 216.

buck-wheat, and also of the flour of lentils, peas, beans, and maize, which, when washed with alcohol, give out fatty and resinous substances; but very little gluten; it contains an organic acid, which I have not succeeded in obtaining pure. It is well known what a small quantity of acetic or of lactic acid is necessary to combine with albumen, or to coagulate casein, and that no method is known of separating the acid again in a state of purity. De Saussure has mentioned another body, which he found in small quantities in impure gluten; he calls it mucin. It contains nitrogen; its composition cannot be very different from vegetable fibrin, as the unpurified gluten of wheat is very little different in composition from vegetable fibrin and albumen.

The analyses of the constituents of Animals shew, in a very distinct manner, how entirely the azotized principles of Vegetables agree in composition with them.

The following are Mulder's analyses after abstracting the incombustible parts:—

	Fibrin.	Albumen.		Casein
		From Eggs.	From Serum.	
Carbon . . .	54.56	54.48	54.84	54.96
Nitrogen . .	15.72	15.70	15.83	15.80
Hydrogen . .	6.90	7.01	7.09	7.15
Oxygen . . .	22.82	22.61	22.24	22.09
Phosphorus .				
Sulphur . . .				

These results agree perfectly with those of Dr. Scherer, who obtained—

	Fibrin.	Albumen.		In the whey of sour coagulated Milk.
		From Eggs.	From Serum.	
Carbon . . .	54.454	55.000	55.097	54.507
Nitrogen . .	15.762	15.920	15.948	15.670
Hydrogen . .	7.069	7.073	6.880	6.900
Oxygen . . .	22.715	22.007	22.075	22.923
Phosphorus .				
Sulphur . . .				

. Dr. Scherer's analyses, according to the qualitative method; gave the proportion of 1 of nitrogen to 6.9, 7.1, 7.2, 7.3 of carbon. When chromate of lead was used, the result in the last tube of gas was 1:8. This last result was obtained also by Drs. Will and Varrentrapp's new method. When milk is allowed to stand till it becomes sour, what remains in the whey, and the analysis of which is here given, is clearly albumen, and is precipitated by boiling: it is certainly albumen, as caseum is more soluble in hot than in cold liquids.

A single glance at the results of these analyses, shews that graminivorous animals receive, in the vegetables which they eat, the ingredients of their blood, namely, their albumen and fibrin, although not in the same state; that the juices of plants contain albumen; that wheaten flour, and corn in general, contain the ingredients of the muscular fibres; that beans, peas, and lentils contain the same substances that are found in the milk of animals. They are nourished by the flesh, blood, and cheese produced by the plants, whilst their own flesh and blood serve as nourishment to carnivorous animals. The resemblance of the azotized principles of vegetables and the ingredients of the blood is not confined to the chemical composition; it is not merely a similarity in the numbers of atoms, but the behaviour with reagents is the same in vegetable and animal albumen and casein.

Vegetable albumen obtained from the juices of plants by boiling, and washed from fatty and colouring matter by alcohol and æther cannot possibly be distinguished from animal albumen, precipitated from its aqueous solution by boiling; the external appearance of the former is the same as that of the latter, and also its behaviour with alkalis, acids, the infusion of gall-nuts, corrosive sublimate, creosote, &c. The same may be said of vegetable casein; this substance appears to occur very frequently in vegetable substances, and is found in considerable quantities in all oily seeds. An emulsion of these seeds is very like the milk of animals, but contains a much larger proportion of albumen. Vegetable milk contains a fat corresponding to butter, also sugar, casein, and albumen; these latter two are evidently in union with alkalis; when heated, the albumen coagulates, and rises with the oil to the surface of the liquid; when separated

from the coagulum it becomes sour in twenty-four hours, and a pure precipitate of caseum is obtained, leaving lactic acid in the solution. A solution of pure crystallized cane sugar left with vegetable casein for several days in a gentle warmth, was converted entirely into acetic acid, lactic acid, and a body resembling gum arabic, just as when left with common animal cheese.

A considerable quantity of sulphuret of potassium is obtained from the casein of sweet almonds and leguminous plants, warmed for a length of time in caustic potash. Acids precipitate protein from this solution, and cause the escape of sulphuretted hydrogen.

The body named vegetable fibrin by me, is the same as that called by Berzelius vegetable albumen of the cereals; but if, as is proved by the analyses, these names refer only to different modifications of the same body, the name of albumen cannot be given to that ingredient of the seeds of the cereals which is entirely insoluble in water, because different names must be given to bodies in different conditions, and the idea of solubility in certain liquids, and coagulation by heat, is inseparably connected with albumen. This substance approaches the fibrin of the blood in all its properties, and all its relations to other bodies: the ashes contain no soluble alkali, whereas, all liquids which contain albumen, such as the serum of the blood, leave a great deal of alkaline carbonates when dried and burnt. The presence of an alkali may be the cause of its solubility in one case, and the absence of an alkali the cause of its insolubility in another; but the albumen of the serum, and the fibrin of the blood, owe their different conditions to the same cause. For this reason, and to avoid the extraordinary confusion observable in the usual descriptions of these bodies, which so greatly resemble each other, I have adopted the name of vegetable fibrin, to distinguish this insoluble modification, although it may not appear altogether appropriate.

Vegetable albumen, fibrin, and casein, dissolve in warm concentrated hydrochloric acid, with the same lilac or violet colour, as the corresponding animal substances; when heated alone, they give the same sulphurous products, and the same horny ammoniacal smell.

When left moist they putrefy; the products of the putrefaction of gluten and vegetable fibrin are in some measure known, and

differ from those of caseum by evolving gas at the beginning, like flesh. Caseum does not do so, but the same solid products are found in both cases; they have the taste and smell of caseum, freed from butter, and as much aposepedin, or, as Gmelin terms it, oxide of caseum, may be obtained from it, in fine, bright scales, like mother of pearl, as from caseum.

Vegetable casein possesses in a high degree the power of fermenting sugar, if it is allowed to stand until putrefaction has commenced. If allowed to stand till putrefaction has made some progress, it is impossible to distinguish it from common caseum; and vegetable albumen gives out sulphuretted hydrogen exactly as the rotten egg. It is not very improbable that casein is contained, in a state of solution, in the juice of grapes, and those plants which precipitate very little albumen on being heated and evaporated. It is known to be very soluble in tartaric acid, and the presence of this acid may be the reason that the sugar is decomposed into carbonic acid and alcohol, and not into lactic acid and mucous matter, as is the case when common caseum or fresh lactate of caseum is used.

It is well known that fermentations may be produced in saccharine solutions by more than one substance. Vegetable casein cannot be considered as the basis of yeast; but the circumstance of the juice of grapes not coagulating when boiled, and entering again into fermentation when allowed to stand, seems to prove that it does not contain vegetable albumen, as this body is well known to be entirely changed by boiling, even when the solution is so dilute that the coagulum cannot precipitate itself.

Another inquiry must, of course, be made, into the properties of all these bodies, and I wish it distinctly to be understood that such is not the intention of the present paper; my desire is to call the attention of physiologists and physicians to the fact that the composition of azotized vegetable nutriments is the same as the constituents of animal bodies, and when this is proved, no doubt can be entertained as to the similarity of the process of nutrition, in graminivorous and carnivorous animals.

A carnivorous animal may be said to feed on what is in no way different from itself; it adds a piece of muscle, as it were, to its muscle; a graminivorous animal may be said also to do the same, be-

cause the food it consumes has the same composition with its own flesh and blood.

The flesh and the blood, the food of carnivorous animals, assumes precisely the same form in their organization as the vegetable casein, albumen, and fibrin in graminivorous animals.

In this sense, then, we may assert that vegetables generate the blood of animals, although physiologists cannot make use of this expression, however correct, chemically speaking, on account of the different states in which these ingredients are found in the vegetable and animal kingdom.

It is really a very remarkable circumstance, that the inorganic ingredients also are the same in both: magnesia, phosphoric acid, lime, iron, alkalies, and sulphur, are constantly found in them; both leave, when burnt, similar ashes.

Animals are distinguished from plants by their capability of moving from place to place, by their sensations, and sensibility, or, in one word, by their senses; for all these purposes certain organs are required, which are entirely wanting in plants; still, the same active principle gives to the bud, the leaves, and the fibres of the root, the same wonderful properties; the plant is alive, as truly as any part of the body of the living animal; they both receive, on the same principle, the properties of growth, reproduction, and the power of replacing again in the system what has been consumed. Of these properties true vegetable life consists; it is developed without consciousness.

Chemically speaking, animal life, although of a rank infinitely higher, generates only the substance of the nerves and of the brain, which are altogether wanting in plants. Although animals receive from vegetables all the ingredients requisite for the formation of blood, and cannot by their own organization generate them from carbonic acid and ammonia, as plants do, the power belongs to them alone of producing those bodies of a higher order, such as in the complex constituents of the brain, the spinal marrow and the nerves. Animals must have peculiar organs for the exercise of the will, the feelings, and locomotion; and these organs must be produced from that part to which the impulse is given. Physiology gives us no decided information on these points; the spleen and the numerous

glands must all have some part to perform in the body, and a necessary one too, or they certainly would not exist.

The growth of plants depends on the continual supply of carbon, and two other elements; and this supply is obtained by the separation of oxygen from the ingredients of their food.

The growth of the organs of a graminivorous animal must depend also on a similar separation of oxygen; but we know that the life of animals, on the contrary, is characterized by a constant absorption of oxygen, although it does not remain in the body; and it is known, from a number of simple facts, that besides the oxygen of the atmosphere, which escapes in combination with carbon, another portion arising from the food must escape also, under certain circumstances, as carbonic acid.

This last oxygen arises from that nutriment which contains no nitrogen, when fat is formed; starch sugar, and gum, cannot be used by animals for the formation of blood, or muscular fibre, because the azotized nourishment they receive contains all that is wanted. The membranes, the cellular tissue, skin, horn, and the claws of animals contain more nitrogen, in proportion to their carbon, than albumen and fibrin. These latter must give up a certain portion of their carbon if the former are produced from the blood: that they are produced from substances with no nitrogen, is impossible.

Now we find that the flesh of graminivorous, and especially of domestic animals, which eat a great deal of food without nitrogen, is very fat; and that this fat may be increased, by increasing the supply of this kind of food. The flesh of carnivorous animals is without fat, and sinewy; all the food which they eat contains nitrogen, except the fat of the animals they devour.

It is evident that starch, sugar, and gum, are incapable of supplying that loss which is continually occasioned in animals by the vital powers; they are incapable of forming muscular fibre, cerebral matter, the membranes, or the bones and sinews, because their only ingredients are carbon, and the elements of water; they contain neither nitrogen, phosphorus, lime, sulphur, nor iron. Children fed on such food become very fat; but neither their muscles nor their bones can increase, and they themselves therefore cannot become stronger. Physicians are well acquainted with the fact, that children who are

not supplied with a sufficient quantity of lime in their food, eat that which they collect from the walls of houses, with the same appetite that they have for their meals.

When we compare the chemical composition of such bodies as sugar, gum, and amylin, with that of fat, we find that they contain the same quantity of carbon and hydrogen, and that the only difference is in the quantity of oxygen, which is smaller in the fat bodies.

According to the analyses of Chevreul, which are the most accurate and most to be trusted, the following is the composition of the fat of swine, of sheep, and of man :—

	Swine.	Sheep.	Man.
Carbon . .	79·098	78·996	79·000
Hydrogen . .	11·146	11·700	11·416
Oxygen . .	9·765	9·304	9·584
	Amylin.	Sugar of grapes and milk.	Gum.
Carbon . .	44·91	40·45	42·58
Hydrogen . .	6·11	6·61	6·37
Oxygen . .	48·98	52·64	51·05

In amylin the proportion of carbon to hydrogen is the same as in the fat of swine, namely 44·91 : 6·11, or as 79 to 11.

Sugar of grapes, sugar of milk, cane sugar and gum, are distinguished from amylin by containing a certain quantity of carbon and hydrogen, in the same proportion as water, over and above what amylin contains ; so that when the composition of amylin is expressed by $C_{12} H_{10} O_{10}$, that of sugar of milk and dry grape sugar will be $C_{12} H_{10} O_{10}$ plus 2 at. aq. ; that of cane sugar $C_{12} H_{10} O_{10}$ plus 1 at. aq.

By merely giving up part of their oxygen, such bodies may become fat, the only substance which contains no nitrogen in the animal organization.

The question then may be asked, is a certain portion of food without nitrogen absolutely necessary to the existence of the life of some animals, merely for the sake of forming fat ? Wild graminivorous animals have no fat, but more muscle than carnivorous ; they become fat before the breeding season or before hibernation, when they take little or no nourishment. This fat must have some use.

Man and every other animal are exposed at every period of their lives to the unceasing and destructive action of the atmosphere; with every breath he breathes out a part of his body; every moment of his life he produces carbonic acid, the carbon of which his food must replace.

If we observe a man or other animal in sickness, or at any time when the body is not supplied with nourishment to compensate for the continual loss, we find him to become lean; the fat is the first to disappear; it vanishes through the skin and lungs, in the form of carbonic acid and water, as none of it can be found in the faeces or urine; it resists the action of the atmosphere on the body, and is a protection to the organs. But the action of the atmosphere does not end with the loss of fat; every soluble substance in the body gives up its carbon, until at last all resistance ceases, and death and decay begin, when every part of the body enters into combination with the oxygen of the air. The influence of the atmosphere is the cause of death, in most chronic diseases; from want of carbon to resist its action, that of the nerves and brain is used. In a normal state of health and nutrition, the carbon of the carbonic acid must have another source. In a second paper, I shall endeavour to shew, that the carbon of such substances as sugar, gum, and starch, is used for the purpose of respiration and the production of animal heat; and that the latter is closely connected with the carbon of the food.—*From Scientific Memoirs for April, 1842.*

Memorandum by Lieut. Postans on the Cultivation of Cotton in Upper Sindh.

1. The cultivation of the plant is of two kinds, distinguished by the nature of the soil, and known in the country as "Boosah" and "Peeawah;" the former being land watered by the overflowings of the river, and also called "Seilabee;" the second, dry land irrigated by wells or water wheels from canals, and also called "Paka."

2. In "Boosah" Cotton cultivation, the land having been well saturated by the inundations, which lie over it for the period of three or four months, is, on their retiring about the month of September, ploughed and otherwise prepared for the seed, but not manured: it thus remains fallow, and without any other process, until the

month of March or April, when the seed, having previously been well saturated, is put in, the weeds are cleared, and the moisture retained in the soil is found to be sufficient for all purpose of production, for no water is thereafter used; the "Gograh" or pod, ripens for plucking about the month of July, and this first is called "Nehree" crop. The plants allowed to remain will sometimes yield a second crop on the following year by cutting them, and opening soil round the roots, this is called the "Moondhee" crop. "Seilabee" Cotton being dependent entirely on the river, is partial according to seasons, but obtains near the stream.

3. "Poko" Cotton land, cultivated by irrigation. The season of sowing is about the same as that of "Boosah," but the soil being dry, the plants are watered regularly. The "Moondhee" or second crops, are gathered from "Poko" Cotton for three years, and the produce is considered to be of a superior description.

4. The seed is of two kinds, known in the country as "Bagrah" and "Suttriah," the plant of the former is of a larger description, I think, than I recollect to have seen in India,—the process of separating the seed from the Cotton is performed by a small instrument of very rude construction called an "Atree," consisting of an iron and wooden cylinder about a foot in length, placed horizontally on two uprights, and turned by two handles, it being the work of one man to put in the seeds whilst the other scrapes the Cotton from off the iron cylinder; it is afterwards further cleared of husk and dirt by the instrument in common use in India; the pods are dried by exposure to the sun; the seeds are in great use for feeding cattle.

5. Cotton is extensively cultivated to the Westward of the river near Shikarpoor in the Moghlee, Nassure, Gosinjee, and Lukkee purgunnahs; the great Cotton country, however, is that known as the Oobah at Sulzukote, east of the Indus, whence Cotton is imported to Shikarpoor for Cutchee and Khorassan. The tax levied by Government on "Boosah" and "Poko" Cotton varies according to the will of the Hakim, and arrangements made under "Puttahs" (grants) with the cultivator, if collected in kind 3d or 2-5th; by assessments, or Zupt from 2 to 4 Rupees per Beegah, one Beegah will yield about 5 maunds uncleaned, or about $1\frac{1}{4}$ of clean Cotton fit for spinning.

Cultivation of Cotton in Upper Scinde.

6. Beyond what is required in Cutchee and Khorassan, nearly all the Cotton produced in Upper Scinde is used for home consumption, in the manufacture of coarse cloths; its price is at present from 16 to 22 Rupees per maund of 88lbs. according to quality. "Oobah" Cotton finds its way to Lower Scinde.

7. The following are the returns of the Imports and Exports for the past year, as collected from the Shikarpoor Custom House; but these do not give any idea of the quantity produced. This article, if not too inferior to the Indian staple to be of any use in the Bombay Market, might be produced in great quantities in these countries; but at present there is no great demand, and the value of the plants is not sufficiently known, the cultivation and preparation are thus of the most slovenly kind.

8. To the North, at Mooltan and Mithenkote, Cotton is also much cultivated; these places are included by the Natives of the country on the general term of "Oobah" before alluded to, though belonging to the Punjaub. Specimens of the various descriptions are forwarded—the Nurmah Cotton, so much prized, is, as before stated, the produce of Khorassan and Herat, and is not cultivated in this country.

(Signed) T. POSTANS.

Asst. Pol. Agent Scinde and Beloochistan
Upper Scinde, Shikarpoor, March 1842.

MEMORANDUM OF IMPORTS AND EXPORTS AT SHIKARPOOR IN COTTON FOR ONE YEAR.

Imported from "Oobah," Maunds (of 44 Asars*)	1,950
Ditto ,, Pergunnahs of Shikarpoor.	108
	2,058

Exported to Cutchee and the N. W.	91
,, to various places in Scinde.	450
	541

(Signed) T. POSTANS. *Asst. Pol. Agent. Scinde and Beloochistan.*

* The Asar, in Cotton weights.

List of Samples.

		Price per maund.
No. 1.	"Oobah" Cotton,	Rs. 19 Shikarpoor.
2.	Shikarpoor district,	18
3.	Jeysulmere,	16
4.	Bagrah seed,	
5.	Suttriah seed,	

(True Copy.)

(Signed) E. J. BROWN,

Assist. Political Agent, Scinde and Berloochistan.
From the Annual Report of the Transactions of the Bombay Chamber of Commerce, for 1841-42.

Extract of Letters from the Collector of Poonah, and his Assistant, regarding the production of Silk, Sugar, &c. in the Deccan.

From a Letter from the Collector of Poonah to the Revenue Commissioner, dated the 23rd December 1841. (No. 2281.)

Cultivation
 G. S. Wergoon Chinchone, Narore, Chassde, Narore Sankotah, Nayengroon Harwer, Gotoor, Hoodassor, Dingorah, Jomiet, Munohar Owsaree.

Para. 52. I have great satisfaction in being able to report most favorably the progress made by Mr. Mutti in extending the planting of the Mulberry tree. I have visited his plantations in the villages enumerated in the margin, and

found them in excellent condition, and there is evidently at the present moment, every disposition on the part of the inhabitants of the Sewnere and Pawbul Purgunnahs, to plant the Mulberry tree. The plantations are usually found in well watered situations, generally where the water is supplied by "pots," and I have seen the trees growing among Plantain Trees and Sugar Cane, which did not appear to injure them, and almost all kinds of garden produce can be raised under the trees, which are usually from ten to twelve feet apart. Satisfactory as this result is, the great anxiety evinced by the people to possess the worms, in order to produce Cocoons, is equally so, and I think, it may fairly be admitted, that nearly all prejudice on the part of Brahmins towards the manufacture of Silk

been overcome, when it is found that they are perfectly ready to wind the Silk from the Cocodas, which process can only be executed, by immersing the Cocoons in boiling water, thus depriving the grub within the Cocoon of life. I have myself seen many Brahmins thus employed, and ready to engage themselves in rearing worms and winding Silk in their own houses, and on their own account; and if it were not that Mr. Mutti considers it advisable for the present to confine the attempts of the people to planting trees, and rearing the worms to form Cocoons, many more Brahmins would be employed in winding Silk, although it involves the destruction of the life of an insect, which is utterly at variance with the precepts and tenets of their religion.

53. Mr. Mutti is desirous of dividing the labour of producing the Silk among three parties, and no plan could have been devised more calculated to give stability to his undertaking.

The first class are those who plant and rear the mulberry trees, and sell the leaves.

The second are those who rear the worms, and sell the Cocoons.

The third are those who wind the Silk, having previously purchased the Cocoons from the second class.

54. The quantity of Silk now made, is limited, on account of the supply of leaves not being sufficient for the support of a greater number of worms, but as the trees increase in size, and when others are planted, it will greatly increase. Mr. Mutti has already this year made 108 lbs. of Silk, which he considers of equal quality to that which he formerly sent to England, and which was so highly approved of.

55. To enable a correct judgment to be formed of the result of Mr. Mutti's undertaking, it is absolutely necessary to visit the scene of his exertions; and I confess I was surprised, when I perceived the extent to which the Mulberry tree had been planted, and the eagerness and anxiety displayed by the people to extend their plantations. They were eager to shew me their fields, and enumerate the quantity of trees they possessed, and have evidently entered with spirit on the task of raising Mulberry Plantations.

56. Messrs. Daniel and Co. have established three Filatures in this Collectorate, one at Koltrood near Poonah, one at Sassoor, and

the other at Narrayengaon. At the latter place I was pleased to see a number of Worms and Cocoons. These Cocoons are very inferior to those I saw belonging to Mr. Mutti in the same place, both in size and softness, which may be attributed to the leaves of the bush not having the same strength and nutriment as the leaves of the trees; a number of acres have been cultivated with the bush, but the appearance is not healthy. I am happy to say that what I anticipated is taking place, and at the distance of 10 or 12 feet, trees are allowed to grow up, which will, I trust, be encouraged.

COTTON.

57. The cultivation of Cotton is on the increase in this Collectorate. The only place in which it is grown in any large quantity is in the Indapoor and Bheemthurry Purgunnahs, where the soil is more adapted to its growth than in any other part of this Collectorate. The produce in the whole of this Collectorate did not amount to more than Rs. (12,000) Rupees Twelve Thousand. Last year, an individual in the village of Kallowree in the Bheemthurry Purgunnah has been successful in introducing a superior quality of Cotton, and as his Cotton fetched a very high price at the Bombay market, equal in short to the best Broad Cotton, he is likely to extend his Cotton plantation.

58. Doctor Gibson and Mr. Dickenson are both of opinion, that the Orleans Cotton is likely to succeed in the Sewnere Purgunnah, and the latter, I believe, intends planting some very shortly.

59. The Potatoe is produced in the Joonier, Pauble, and Kben Purgunnahs, now in great abundance, and is exported to Bombay. It is sold here at the rate of 10 seers per Rupee of the 1st sort, and 15 seers for the Rupee of the 2nd sort, and 20 seers for the Rupee of a very inferior quality. The credit of the successful introduction of this vegetable in these Purgunnahs is due to Dr Gibson. The Potatoe in the districts already mentioned is large, and equal, in my opinion, to any grown in any part of India.

*From a Letter from Mr. Roze, Assistant Collector to the Collector,
dated 4th November 1841, (No. 4.)*

MAURITIUS CANE CULTIVATION.

Para. 30. As connected with the Agricultural improvement of the Sewnere district, I am happy to report that the cultivation of Mauritius Sugar Cane has greatly increased, and there is no doubt that it would continue to increase, if the demand for it increased. I am convinced that I speak within bounds, when I say, that about one hundred and fifty beegas of land have been planted with this cane this year. Of these, about one hundred beegas have been planted under contract with the manager of the Sugar manufactory at Hewree, and the remainder on the private resources of the cultivators, in the hope of obtaining a market, at the Hewree manufactory. In this, I am afraid, they are likely to be disappointed, as the manufactory with its present establishment, cannot work up much more than one hundred beegas of Cane during one season, and I imagine, that this quantity is sufficient to supply the present demands upon it. Very little of the Hewree Sugar has hitherto been purchased by the Natives, and its sale, I imagine, is nearly confined to the consumption of the European inhabitants of Poonah and Nuggur. Without an increased demand for the produce of the manufactory, we cannot expect that its demand for Cane will increase, and as the cultivators of the Mauritius Cane are entirely dependent on it for a market, there is reason to fear that the cultivation of the Cane will not increase.

31. The Mauritius Cane having been cultivated with great success throughout the Sewnere Purgunnahs, and to a very considerable extent *without irrigation*, it is most important that the cultivation of it should meet with every encouragement. Perhaps Government might, at a small cost, be able to encourage the growth of the Cane by purchasing Hewree Sugar, and importing it for the use of troops on foreign service, in Scinde, Aden, &c.—*Ibid.*

Directions to Farmers for the Culture and Preparation of Flax.

The following observations, as extracted from the Reports of the Deputation to Belgium, are recommended to the notice of flax-growers, with a view of inducing a more careful preparation of the land for the flax than hitherto practised, with other general instructions regarding the management of the crop through all its stages :—

SOIL AND ROTATION.

With attention and careful cultivation *Flax* may be grown upon any soil, but its quality will altogether depend on the *preparation* of the land for the crop, where a porous subsoil, (such as Belgium and Holland naturally possess) cannot be met with, nor a dry, deep, rich and arable loam, (such as the plant thrives best in) be had. Art and labour must supply the deficiency of nature, and thorough draining, trenching, and manuring must create deep soil and enrich it. It is not, therefore, to the *immediate* preparation of the soil for the Flax crops, that its abundance or good quality is to be chiefly ascribed or looked for, but to a *gradual system* of *amelioration*, which will bring the land into the high condition required for this plant. In Belgium and Holland every rotation begins or ends with Flax, and under a judicious rotation, and a course of continual improvement of the soil, can alone the finest qualities of the Flax be raised ; for, let it be understood, that no sort or quantity of manure put into the land the time the Flax is sown, can produce so large or so good a crop as will grow in land gradually and *properly prepared*. The Flax crop abroad usually follows oats, sometimes wheat or barley, but potatoes scarce ever—and its rotation seldom comes round under the seventh year, and more often *later* than *under* it.

PREPARATION OF THE GROUND AND SOWING.

The course that must universally be adopted by our Farmers to ensure Flax of superior qualities, is, as in Belgium, to plough early *in autumn*, throwing the land into high ridges, thereby giving it the benefit of the action of the frost and air, and by good draining, (whether it be subsoil or surface) to keep it free of water throughout the winter ; two light ploughings, with harrowings, to be given

in spring to pulverise the soil, and kill the weeds; the first to be as early as possible, so as to admit of at least a month's interval, and the harrowing each time to be just before the ploughing, after which the drains to be carefully dressed up again. Following the last harrowing, it is necessary to roll, to give an even surface and consolidate the land, breaking this up again with a short toothed or seed harrow, ere sowing; (or the back of a harrow will do) and after sowing, covering it with the same, going twice over it, (or with a bush harrow,) and finishing with the roller and making clean the furrows. The seed should be sown very thick, about 160lbs. to the English acre, (as calculated from the Flemish measure) this ensures the Flax being finer, and prevents the plant branching out and from being overloaded with seed, which will never ripen equally, and will occasion coarse branchy tops to the plant: it should also be sown in ground rolled and prepared almost like an onion bed, for if the seed should be covered more than an inch it will not briard, and this fact occasions the frequent disappointment of a thick crop to the farmer, who had a right to expect one from the liberality with which he had given the seed. It is not advisable to sow clover or grass seeds, with the Flax crops, but *the farmer will do it abroad* as well as at home, and what he may lose in the quality of the one, he has some compensation for, in the *accommodation* of the other. In some parts of Belgium, the preceding crops to the Flax has often a double quantity of manure given to it. Or more frequently when the land requires it, some very rotten dung is ploughed in with the stubble, and this becomes completely decomposed during the winter, the quantity of manure depending on the state of the soil as to fertility; but special care is taken that no *hot* dung is used for this crop, and nothing which, by any chance, can increase weeds. Liquid manure is, however, frequently given to land preparing for Flax, and generally laid on the ground after the rolling before breaking up for the seed, it being an essential condition that, previous to sowing the Flax seed, the land is quite clean and free of weeds—a thousand gallons of urine from drainings of the house, stable, byre, and dung heap, in which the emptying of the privy have been steeped, and often with the addition of from 600 to 1000 lbs. rape cake mixed with it, is frequently given to the acre on which Flax is grown—it is

carried out in tubs on handbarrows, and ladled evenly over the land, or pumped into casks on carts, like the watering carts in our streets, and sprinkled heavily over the ground; if from a roller cart the better—from three to ten days is allowed for it to soak in, and then the breaking up to receive the seed, harrowing and rolling, as before; besides clover or grasses, carrots, parsnips, and turnips are often sown with the crop abroad, the soil being in a high state of cultivation for these roots; but *careful cultivators* allow of nothing to divide the juices of the soil with the plant. *When these roots are sown with the crop*, liquid manure is given after the pulling of the Flax and weeding of the ground, when they spring up astonishingly fast; it may be added, as not generally known, that the fine suckers and roots of good Flax will strike into the ground a depth equal to one-half the height of the plant, therefore the soil must be deep and well tilled to admit it, and ensure its thriving well.

WEEDING.

The next operation is to weed the Flax as soon as it is a few inches high, and can readily be distinguished from the weeds—one great cause of the superiority of the Foreign Flax arises from the pains taken to weed it—the crop is sure to pay for all the expense incurred. This is done abroad by women and children, who, with coarse cloths round their kness, creep along on all fours, this injures the young plant less than walking over it, they work also facing the wind, so that the plants laid flat by their pressure on them, may be blown up again, or thus be assisted to regain the upright position. This fact proves among many what minute attention is paid to every circumstance which can possibly affect the crop—the tender plant pressed one way soon recovers, but twisted, swirled, or flattened in different ways it seldom does.

PULLING AND RIPPING.

To judge of the time of pulling, the best criterion is, when about two-thirds of the stalk is observed to turn yellow, and to lose its leaves; but the fibre is in the best state before the seed is quite ripe, and if this alone should be the object of the farmer, the flax should be pulled without waiting for the seed to fully ripen, but then the

seed is valuable for the oil it contains, or for feeding, and forms an important object in the value of the crops, as it will produce from 41. to 51. per acre, Irish. These advantages are to be balanced and determined, only, by the grower's skill, and some judgment is required as to the time when the greatest value from the crop may be secured: for there is great variety of opinion on this point; in Belgium the early pulling is reckoned to yield the finer Flax, while in Holland, they think that though it may appear finer, it is weaker and greatly deficient in weight from the scutchers and the hackles; when any of the crop is lying, it should be pulled as soon as possible and kept by itself, as should the long, middling and short, and tied up separately. This is particularly attended to on the Continent, and must be a great means of enhancing the value to the spinner, and consequently the grower, who will be amply paid for the extra trouble: when the Flax is pulled, it is laid on the ground in handfuls, heaped in small parcels, each handful crossing its fellow, and left to dry for a day or two, and then tied up in small sheafs or bundles (that would about fill both hands) carried off the field for rippling, or done on it, and then taken away to the steeping pools. But the Courtrai system of stooking the Flax as soon as pulled, without binding it, is well adapted to this country, with the handfuls set up and resting against the other, the root ends spread out and tops joining like the letter A, forming stooks of about eight feet long, and a short strap keeping the ends firm, in this way it will resist rain and wind well, and dry fast: in eight or ten days it may be bound up in small bundles, and carried to ripple and steep; or it may be stacked in the field, or put into a barn, the seed to be taken off at leisure in winter, the Flax to be steeped the following May,—a system strongly to be recommended for this country where the convenience of parties will admit of it—as for steeping and grassing the best season of the year is ensured, and it is a time of comparative leisure, when attention is not called off to the harvesting of other important crops. The Flax is said also greatly to improve by keeping over even for two or four years.

WATERING.

This should be done in soft water, and to ensure this, let the steep holes be filled some weeks before required, that the sun and air may

soften and warm it—they should be dug from six to twelve feet wide, by about twice the width for the length, or they be of any required length, and to be filled from running water if possible, and after the Flax is put in, to carefully exclude any addition, except in case of leakage, and then to add most cautiously. Boggy water, or any tainted with minerals must be avoided, and to guard against the risk of such getting into the ponds, when suspected to be in the soil; it would be well to cut a drain round the pool, and thus carry it off from entering it. On the Continent the same pools are used year after year, and usually are planted round with the alder, whose leaves falling into it, are said to improve the colour of the Flax, to kill insects that would injure it, and to soften the water; but others, again, give no faith to these notions; the holes are generally four feet deep at least, and the bundles of flax are laid in nearly upright, the root-ends downwards, in rows the width of the pool, each row inclining against the other, and every second or third tier as laid, is covered with mud from the bottom, or straw and boards, or thin sods or screws, (with stones would do in this country, where they can be had,) taking care that all is well covered and kept below the surface of the water; the men placing the Flax are thus engaged—standing up to their loins for a whole day, carefully arranging the bundles as handed to them. The steeping will take from ten days to twenty, according to the time of the year, heat of the weather, and the nature of the water, and somewhat on the ripeness, greenness, or dryness of the Flax. But every grower should learn to know when the Flax has had enough of the water, as a few hours too much may ruin it; and on the Continent they watch it closely as the time draws near, looking at it every two or three hours, and when they find that breaking the straw in the middle, that the fibre will draw free of the shive from each end, it is ready to lift; the bundles are then placed on their ends for a day, packed close together to drain, ere loosed to spread on the grass, and if the weather should happen to be bad, left some time longer in this way, for much wet at this stage would injure it much.

GRASSING.

This operation is of much more importance than generally supposed. The Flax should be spread upon short pasture, thicker than

usual, keeping the rows very even, for the sake of turning it readily, which should be done every second or third day, to ensure a uniform colour, free from streaks, which Irish Flax always has from bleaching on one side only : and thus on this one account (as well as many others) is of lower value than the foreign ; it is turned without cost of either much time or trouble, by a long rod being slipped under it, and may require from ten days to thirty or more, if it has not had steeping enough, (immediately after rain is the best time to turn it.) It must be lifted on a dry day, tied up again in small bundles, and if not taken soon to the mill or hand-scutched, will be much improved by being put up in small stacks loosely built, with stones or brambles in the bottom to keep it dry and help to let the air circulate through it. To guard against wind lifting it in this state, the most sheltered spots should be chosen for grassing until it is fit to tie up.

MILLING AND HAND-SCUTCHING.

In the scutching and dressing of Flax we are far behind the people of the Continent ; and we would solicit all classes of friends to the linen trade in this country—the scientific, mechanical, and intelligent—to take the subject into their consideration. That our present machinery is defective, all admit ; and by our country system of hand-scutching, Flax is turned out so badly, that it rates even lower in the market than the first. One cause of this, undoubtedly, is the farmer drying the Flax on turf fires, and small temporary kilns, formed of sods and wattles, where it is liable to be scorched and browned, so as not only to discolour the Flax, but also to make it hard and *haskey* from the hackle, brittle, and difficult to bleach. But the main cause that we do not equal our Continental neighbours in this process, is the want of *that due attention and careful management* so conspicuous in every stage of their proceeding. They tie up their Flax very neatly ; and begin with keeping the ends even, and from first to last never taking it out of the order it grew in, never mixing heads and tail-ends, and short and long, bad and good together. In Holland and Belgium, they generally, if not universally, handscutch their Flax ; and some *Irish Flax*, prepared by the Dutch, was found *superior* to any grown in Holland ; and Mr.

Demen, the Belgian agriculturalist, states, that he thinks some of what has been submitted to him to superintend the hand-scutching of, will be worth, when ready for the market, 140*l.* per ton. What he and the Belgian labourer have handled ready, whether in the mill or by hand-dressing, has been pronounced by the spinners and judges worth 2*s.* to 3*s.* a-stone, at least, more than what had been cleaned under the old negligent process. But this is not all. By experiments on a small scale, the produce of clean Flax from the straw, under the Belgian's management, was about *one-fifth* of the weight, besides tow of three qualities, the first of some value; whereas the produce of an equal quantity of straw sent to the mill and scutched the usual way, was but *one-seventh* of the whole, and but one species of tow sent home, of a very inferior quality. Some experiments are, however, making by the Society on a large scale, which will be published to the country. In the meanwhile, by offering a large premium to millowners and mechanics, they hope to have great improvements in mill machinery effected ere next year; and to the country farmer, who has scutched at home, they would encourage him to try the effect of a more careful system of handling and dressing, keeping the straw and fibre even, breaking or crigglng the shove or woody part better, and drying in the open air, or hanging up a sheaf or two in their houses a day or so before labouring at it, or let them take any means excepting the kiln-roasting it, by which it has hitherto been so injured.

Great waste is occasioned in the mill, (and loss of time and material in hand-scutching as well), when the Flax comes damp from the grass, as it too generally does late in the season, or when it has not been sufficiently steeped. To remedy this evil, the practice is to add more power to the scutchers, and consequently more loss ensues to the owner, whereas attention to the state of the Flax, ere sent to the mill, should be the remedy. But to assist the farmers in wet seasons, drying-houses might be constructed in the different Flax districts, where large quantities might be dried by heated air or steam pipes; the common corn-kilns throughout the country might dry a little at a time, when not otherwise employed, but their compass is too contracted to answer a general purpose. Owners of spinning-mills, or whatever steam engines are used, might

find such appendages to their works profitable. In the mills much more care must be taken in the rolling. It would require to pass through different sets of rollers of varied dimensions of groove, so that the shove or woody part will be minutely broken, which will occasion it to be more easily scutched, and less liable to be *slaved* or wasted, as it is the long unbroken shoves that tear away the Flax; scutchers *thus* might be lighter than those in use. In hand-dressing, the same directions apply: if well beaten, the cleaning is easy and yield more abundant. The Belgians use also a scraper and a comb, which greatly contributes to the nice order they turn it out in, and which pleases our spinners so much; for several of these gentlemen declare the using Irish Flax is so much wear and tear, and loss, that they would rather pay two prices for foreign than use it, and some on these grounds, never use it *at all*. But it is hoped that defects so injurious to all parties, and to the country at large, will be remedied; and by care, attention, and the means now taking by the Society to remove them, may be shortly effected.

SAVING THE SEED.

It is hoped that the value of the seed now being made known, that henceforth *all* will ripple it. The Flax is easier handled in the water, and in spreading, after being rippled; and the bows, whether green or ripe, may be kiln-dried, and husk and seed together ground into meal for cattle feeding, no other substance known being better for milk, butter, or fattening;—but observe how vermin thrive on it, for even after it has been steeped, rats will prefer it to corn. To the crushed for oil, a little kiln-drying will not hurt it; but if for sowing, the crop should be allowed to ripen, or nearly so, dried for a few days in small handfuls laid across, or in small sheaves, broad strap; and a good way is to build them up in a stack, with alternate layers of dry straw, to thrash out in spring, always preserving even the *chaff* for the *cattle*, as it contains much nourishment; of course, in this case, the steeping had best be kept over until the spring.—*From the Proceedings of the First Annual General Meeting of the Society for the promotion and improvement of the growth of Flax in Ireland.*

Manure among the Chinese.

In arranging the various classes of the people, the Chinese place the literati in the foremost rank, as learning is with them the stepping-stone to honour ; but, immediately after the learned, the husbandman takes the precedence of all others, because, being engaged in raising the necessaries of life, he is abundantly more important than the mechanic, who merely changes the form of matter, and the merchant, who originates nothing, but only barter and exchanges commodities for the sake of gain. This honour put upon agricultural employments is evidently the result of design ; and shews that the country, being overstocked with inhabitants, needs cultivating to its utmost extent, in order to provide the people with sustenance. The industry and skill of the Chinese, striving to produce as many of the necessaries of life as possible, would also argue a dense population, ever struggling against threatening want, and compelled to exert themselves for their daily bread. In tropical climates, where the ground is fertile and the population scanty, the natives find that by a few months' labour they can produce sufficient food for a whole year's consumption ; and are, therefore, indisposed to exert themselves further : but in China the inhabitants are incessantly employed ; and every individual is obliged to be busy in contributing his quota to the commonweal. Every one in the least acquainted with the manners of the Chinese, knows that they are untiring in their exertions to maintain themselves and families. In the business of agriculture they are more particularly active ; raising two crops from the ground every year, extending their cultivation, and bringing the most unpromising spots into use, in order that nothing may be lost. Their skill in effecting these objects is not, considering their few advantages, contemptible. They thoroughly understand the importance of varying the crops ; they know perfectly well the seasons and soils adapted for certain productions ; and they are fully sensible of the importance of manuring the ground, in order to maintain its fertility. A stranger is struck with this on first setting his foot on the shores of China. Most individuals met in the paths of the fields are provided with a basket and rake ; and every evening the cottager brings home a certain quantity to add to the dung-heap, which is a most

important appendage to every dwelling. Having but few sheep and cattle, they are obliged to make the most of the stercoraceous stock of man and swine. This is carefully collected, and actually sold at so much per pound; while whole strings of scavengers may be seen cheerily posting into the country every successive morning with their envied acquisitions: little heeding the olfactory nerves of the less interested passengers. Every other substance likely to answer the end is anxiously collected, and carefully disposed, so as to provide for future exigencies; such as decayed animal and vegetable matter, the sweeping of streets, the mud of canals, burnt bones, lime; and, what is not a little singular, the short stumpy hair, shaven from millions of heads every ten days, is industriously gathered, and sold for manure throughout the empire.—*Madras Almanac.*

Monthly Proceedings of the Society.

(Wednesday, the 11th January, 1843.)

The Honorable Sir J. P. Grant, President, in the Chair.

(UPWARDS OF 120 MEMBERS PRESENT.)

Members Elected.

The Gentlemen proposed at the December Meeting were elected Members; viz.

Baboo Brijonat Dhut; Lieutenant Henry Wilson; Messrs. Edward Pickard; J. W. Carter; H. W. Lake; H. C. Watts; R. W. G. Frith; John Edward Becher; R. H. Buckland; Captain Goodwyn, and Captain Buckle.

For Election.

The names of the following gentlemen were submitted as candidates for election:—

Duppa Hamilton Kearnes, Esq. Indigo Planter, Jessore, proposed by Mr. Geo. Hill, seconded by Mr. Piddington.

Rajah Ramchund Sing, of Nurseerpore, Mōorshedabad, proposed by Mr. John Laidlay, seconded by Mr. W. Storme.

Samuel Bowring, Esq. Civil Service, proposed by Dr. Hufnagle, seconded by Sir John Grant.

James Curtis, Esq. Indigo Planter, Jessore, proposed by Dr. Hufnagle, seconded by Dewan Ramcomul Sen.

Captain Rogers, R. N. Master Attendant, proposed by Mr. J. M. Seppings, seconded by Dr. Corbyn.

Spencer Judge, Esq. Solicitor, proposed by Mr. Seppings, seconded by Dr. Corbyn.

Captain Clapperton, Assistant Master Attendant, proposed by Mr. Seppings, seconded by Dr. Corbyn.

James Small, Esq. (firm of Glass and Co.) proposed by Mr. Longueville Clarke, seconded by Dr. Playfair.

R. Cruise, Esq. Delowry Factory, Purneah, proposed by Mr. S. G. Heatley, seconded by Dr. Corbyn.

William Griffith, Esq. Acting Supt. of the Botanic Garden, proposed by Mr. W. Earle, seconded by Lieut. Col. Forbes.

Presentations to the Library.

1. Annual Report of the Transactions of the Bombay Chamber of Commerce for 1841-42. *Presented by the Chamber.*

2. Transactions of the Society of Arts, vol. 53. Part 2. *Presented by the Society.*

3. A few copies of the Proceedings and Reports of the Society for the improvement of the culture of Flax in Ireland. *Presented by Mr. James Emerson.*

4. The Planters' Journal, Nos. 25 to 28. *Presented by Mr. Speede.*

5. The Literary Gleaner, No. XI. of vol. 1. *Presented by the Proprietor.*

Garden.

1. A supply of Foreign Barley, Wheat, Flax, and Hemp seed. *Forwarded by Dr. Royle by the 'Hindustan.'*

2. A supply of Nepal Red and White Clover seed. *Presented by B. H. Hodgson, Esq.*

Vote of Absent Members.

The Deputy Secretary having read the proceedings of the meeting of the 14th December, it was moved by Mr. Wale Byrne, seconded by Mr. Montague, "That the proceedings of the last meeting be confirmed, with the exception of that Resolution which denies to Mofussil members the right of voting on particular questions."

Mr. Byrne addressed the meeting in support of his proposition. Dr. Corbyn also added a few words to the same effect. Mr. Piddington stated that he was authorized by the five subscribers thereof, members of the Society, resident at Jessore, to read to the meeting the following protest :—

Protest.

We, the undersigned members of the Agricultural and Horticultural Society of India, persuaded that the total exclusion of non-resident members from voting, on occasions when their votes can be conveniently received by letter, will be most injurious to the true interests of the Society, as it is detrimental to their just rights, and learning that this measure was determined upon at a small meeting of sixteen or eighteen members, of which a part only voted; and that the majority was at most of two or three votes; do hereby protest formally against this determination, and claim as a matter of common fairness, and of deep import to the future welfare of the institution, that this question be re-considered previous to the election of the Secretary.

Signed { R. C. Bell for himself and Louis Durup de Dombal and
Michael Durup de Dombal.

Signed J. St. Pourcain for himself and Mr. Douzell.

The Hon'ble the President stated, that he had just received the following communication, to his address, on the subject now under discussion, which he begged to submit to the meeting :—

TO THE HON'BLE SIR J. P. GRANT,

President of the Agricultural and Horticultural Society of India.

HONORABLE SIR,—We, the undersigned members of the Agri-Horticultural Society, residents in the Mofussil, being dissatisfied with the resolution passed at a Meeting of the Society held in Calcutta

on the 14th December; viz., "That the votes of absent members for the Secretaryship tendered in writing be not accepted," beg to protest against the appointment of any individual to fill the vacant Office of Secretary, without the votes of absent members being taken, and the election made according to the general voice of the Society.

That a small portion of the Society should meet together and vote themselves exclusive privileges is an assumption we are unwilling to admit, and we now claim a right of vote, not only in the election of a Secretary, but on all questions of importance, *where the delay in procuring our votes would not be detrimental to the interest, or impede the working of the Society.*

(Signed) W. St. QUINTIN, C. S.	C. GARSTIN, C. S.
C. C. RAVENSHAW, C. S.	J. REID, C. S.
A. SMELT, C. S.	J. B. DICKSON, M. S.
E. A. SAMUELLS, C. S.	J. B. COLVIN, C. S.
E. DRUMMOND, C. S.	

On the perusal of the above letter, Mr. Piddington spoke at some length in support of the proposition of Mr. Byrne; the question was then put to the vote and carried by a large majority.

Disposal of Motions.

Tribute of respect to the Memory of the late Secretary.

The motion of which notice, to the above effect, was given by Dr. Corbyn at the September meeting, and which was postponed at the last Meeting in consequence of the absence of the mover, was again brought forward.

Dr. Corbyn having spoken briefly in support of his motion, Mr. Hume suggested the desirableness of putting it in less general terms than those now employed, and the meeting coinciding in the suggestion, Dr. Corbyn agreed to withdraw the motion, in favor of another, in an amended form, of which he would give notice at the next general meeting.

Secretariat Department, Report of Finance Committee, Appointment of an Honorary Secretary.

The motion of which previous notice had been given by Mr. Hume, seconded by Dr. Huffnagle, to the effect that "the question of amount from this Society's Fund paid to the Secretariat Department be re-opened, with a view of reducing it to an amount more in keeping with the means of this Society," was next submitted.

Mr. Hume, having previously addressed the meeting, in support of the above motion, begged leave to submit the following proposition, which was seconded by Dr. Huffnagle :—

"That as the state of the Funds of the Society does not warrant any increased expenditure for Secretariat or Editorial duties, an Honorary Secretary be elected to assist the present paid Deputy, and that the Monthly Journal be conducted by the Committee of Papers, as it is at present, until the Society be shewn that the system does not work well, or until its funds justify a further outlay, if then it may be considered advisable."

In connection with the above proposition of Mr. Hume, the Honorable the President stated, that he had received from the Members of the Finance Committee a report of the financial operations of the Society during the past year, and which he begged to submit to the meeting; it was accordingly read by the Deputy Secretary, as follows :—

Report of Finance Committee.

The Finance Committee beg to submit for consideration the following report, drawn up at a meeting held Jan. 10, 1843, of such affairs of the Society as have been entrusted to their management during the past year.

The particular statements annexed duly exhibit,

By No. 1. The *Receipts* from the 1st of January to the 31st of December, 1842, to be Company's Rupees 22,933 : 5 : 4, and the *Disbursements* for the same period Co's. Rs. 22,219 ; 5 : 0.

By No. 2. It will be shewn that the sum of Company's Rupees 10,133 : 5 : 4 is invested in Government promissory notes, and deposited, in accordance with a vote of the Society, with the Government Agent.

By No. 3. That the subscriptions in arrears amount to Rupees 7,346 : 14 : 0, exceeding the outstanding risks of last year.

By No. 4. List of Bills Payable, and

By No. 5. A memorandum of the Assets and Liabilities of your Society for 1843.

The Committee further beg to state that, within the last few months a change of considerable importance has taken place materially affecting the resources of the Society.

From the 14th of December last, up to the 31st, 16 members have withdrawn; and from the 1st of the present year to date, 15 more have sent in their resignations, making a total of 31 gentlemen, who have requested their names to be struck from the list of Members.

The grant of "Free Postage" hitherto enjoyed by a special favour of Government, has been rescinded, and an additional expense of at least Rupees 1,000 per annum falls upon the Society.

It also appears from these statements carefully prepared, that on the 1st of January, 1843, the *Cash Balance* under the controul of the Committee was only 715 Rs., and they have to regret, their duty compels them to make known to you, that the funds committed to their charge do not warrant any increased expenditures; indeed they cannot too fully impress upon you, the absolute necessity of husbanding the resources of the Society with the most rigid economy, and in conclusion, beg that the statement now submitted may receive due consideration, in order that the Society may at all times be fully able to meet its engagements.

(Signed) CHARLES HUFFNAGLE,
 „ M. S. STAUNTON,
 „ RAM COMUL SEN,
 „ JAMES HUME.

The Hon'ble the President took occasion, at the conclusion of the reading of the foregoing report, to add a few words on the present state of the funds of the Society, and the necessity of attending to the suggestion of the Finance Committee, of husbanding, as much as possible, the resources of the Society, in order to carry out the legitimate objects of the Institution. The proposition of Mr. Hume was then put to the vote, and carried unanimously.

It was next moved by Mr. Turton, seconded by Mr. Morton,

"That Mr. Hume be requested to accept the office of Honorary Secretary."

Mr. Hume having signified his willingness to take the appointment, the motion was put to the vote, and unanimously agreed to.

Election of Office-Bearers

The President intimated, that this being the anniversary meeting, it was necessary that the election of Office-Bearers for the current year should be entered on; he would beg to observe, that two vacancies had occurred in the list of Vice-Presidents, in consequence of the absence of Dr. Wallich from India, and the departure of Dr. Grant for England.

The Members then proceeded to the election, and the result was as follows :—

The Hon'ble Sir John Peter Grant, *President*.

C. K. Robison, Esq.	} <i>Vice-Presidents.</i>
Dewan Ramcomul Sen, . . .	
Baboo Dwarkanath Tagore,	

James Hume, Esq. *Honorary Secretary*.

A. H. Blechynden, Esq. *Depy. Secy. and Collector*.

It was resolved to defer the filling up the vacancy caused by the departure of Dr. Grant, as also the revision of the Standing Committees, till the next general meeting.

Horticultural Exhibition,—Anniversary Dinner,—and Cattle Show.

The President next called attention to the Annual Exhibition of Vegetables and the Anniversary Dinner, and proposed, with reference to enquiries which had been made of the market gardeners as to the period when the vegetables would attain their greatest perfection, that the Exhibition should take place on the morning of Thursday, the 26th instant, and the dinner on the evening of the same day. This arrangement was agreed to, and the Agricultural Committee was accordingly requested to arrange the necessary details.

The Cattle Show it was agreed should be held, as on the former occasion, on Wednesday the 1st proximo.

Proxy Question.

The following notice of motion was given by Mr. Turton, seconded by Dr. Huffnagle.

“ That the question of proxies be again considered, with reference to their admission, at the next meeting

Moved by Dr. Corbyn, seconded by Mr. W. Byrne, and resolved “ that a Special Meeting be held this day week to take the above subject into consideration, with reference to the number of Mofussil members now in Calcutta.”

Moved by Mr. Hurry, seconded by Mr. Heatly and carried. “ That the question of the late increase of the subscription be also reconsidered at the Special Meeting.”

*A Special Meeting of the Society was held at the Town Hall, on
Wednesday, the 18th January, 1843*

The Honorable Sir J. P. Grant. President, in the Chair.

(ABOUT THIRTY MEMBERS PRESENT.)

The Hon'ble the President opened the business of the day by stating, that the present meeting was summoned, in pursuance of a Resolution, passed at the general monthly meeting, held on the 11th instant, to take certain subjects into consideration. He would read the Propositions in the order in which they were submitted on that occasion : viz :—

Moved by Mr. Turton, seconded by Dr. Huffnagle,

“ That the question of proxies be again considered, with reference to their admission at the next meeting.”

Moved by Dr. Corbyn, seconded by Mr. Byrne, and resolved,

“ That a special Meeting be held this day week to take the above subject into consideration with reference to the number of Mofussil members now in Calcutta.”

Moved by Mr. Hurry, seconded by Mr. Heatly and carried,

“ That the question of the late increase of the subscription be also reconsidered at the Special Meeting.”

The President intimated, that before entering on the discussion of the above topics, he would beg to read the following Requisition :

TO THE HON'BLE SIR JOHN PETER GRANT, KT.

President of the Agricultural and Horticultural Society of India.

HONORABLE SIR,—We, the undersigned Members of the Agricultural and Horticultural Society of India, considering that the Resolution passed by the Society at the meeting of the 11th instant, and the consequent election of Mr. Hume, as Honorary Secretary, involve a fundamental change in the whole system of our labours and management as carried on for several years past, and a violation of the now recognised privileges of Mofussil and absent members to vote in such elections and to be referred to on questions of such a nature; and considering also that if a meeting be held on Wednesday next, time will not be allowed for non-residents to express their views on these most important questions,—do hereby present, Sir, our respectful Requisition that you will be pleased to postpone the meeting to such day as will allow of a reasonable time for communication with the most distant stations.

H. Piddington, for himself and fifty-four (54) Mofussil members, whose written votes he holds.

J. St. Pourcain, for himself and Mr. Douzell; R. C. Bell for himself and Louis Durup de Dombal and Michael Durup de Dombal.

E. B. RYAN, by J. H. STOCQUELER.

G. T. FRED. SPEED.

With reference to the signatures, the President said he could only take Mr. Piddington's as for himself, and so of the third name, while the authority of Mr. Stocqueler, who was not a member, to sign on behalf of any one else did not appear.

The President then read the reply to the Requisition, which was as follows :—

Calcutta, January, 17th, 1843.

GENTLEMEN.—I had the honor to receive yesterday evening a Requisition addressed to me as President of the Agricultural and Horticultural Society of India, signed by you, and conveying as I presume your opinion of the wishes of several absent members, and de-

livered to me by Mr. Piddington, desiring, for the reasons therein stated, that I would postpone the meeting of the Society resolved by the last meeting of the Society on the 11th Instant, after I had left the chair, to be specially held to-morrow.

I am unable to comply with the desires of this Requisition, being unacquainted with any power possessed by the President of this, or any other Society, to rescind the votes of a general meeting. But I will lay your regulation before the meeting to-morrow.

I have, &c,

(Signed) J. P. GRANT, *President Agri. Society.*

At the termination of the perusal of the above correspondence, Sir John Grant said, that as President of the Society, he would be always ready and willing to meet the wishes of its members on all subjects connected with the operations of the Institution, but that he never could rescind, individually, the resolutions of a General Meeting.

Mr. Turton having addressed the meeting at some length in favor of the motion of which he had given notice at the last general meeting, begged to submit the following for discussion on the present occasion ; viz :—

Proposed by Mr. Turton seconded by Mr. Kaye :

“ That on the question of the election of all paid officers of the Society or for the salary to be given to any officer of the Society, absent members shall be allowed to vote by letters addressed to the Secretary, post paid, stating the person for whom they intend to vote ; and that on all questions carried by a meeting in Calcutta, the question shall be again submitted to the Society, to confirm or rescind the same, upon the requisition of any ten members in writing addressed to the Secretary ; at which subsequent meeting every absent member shall be entitled to vote by letter addressed to the Secretary, post paid, stating the purport of his vote.”

Mr. Piddington submitted the following as an amendment on the above proposition :—

Moved by Mr. Piddington, seconded by Mr. D. Ainslie :

“ That this meeting fully recognizes that its non-resident members have now, have always had, and shall continue to have the right to

vote on all questions in which their interests in the Society are concerned."

Mr. Piddington spoke in favor of his amendment, and was supported by Mr. Speed. Messrs. Hume, Kirkpatrick and Turton also addressed the meeting. After a long discussion, the amendment was put to the vote and negatived.

The original motion was then submitted, and carried unanimously

The Honorary Secretary intimated, that the next and last question for submission was that relating to the late increase of subscription. He begged to state, that according to a rule of the Society, it was necessary that one month's notice should be given on all questions relating to finance. He had not heard this notice given at the last meeting, or he would have called attention to the rule in question.

In the absence of Messrs. Hurry and Heatly, the mover and seconder, Mr. Turton proposed that the motion, should stand for consideration at the next general meeting: and this was agreed to.

*Meteorological Register kept at the Surveyor General - Office
Calcutta, for the Month of January 1843*

*The Observations after Sunset are made at the Honorable
Company's Dispensary*

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A comparison of the two Barometers, the Mercury in that at the Dispensary stands 1/10th of an inch higher than that in use at the Surveyor General's Office

Correspondence and Selections.

PRECIS OF LIEBIG'S ORGANIC CHEMISTRY IN ITS APPLICATION TO AGRICULTURE AND PHYSIOLOGY

*Extract of letter from H. CARRE TUCKER, ESQ., (Bengal Civil Service)
dated London, 24th of December, 1842.*

“As a member of your Society, and an anxious well-wisher to the Agriculture of India, I beg to draw your attention to J. Liebig's work on “Organic Chemistry, in its application to Agriculture and Physiology,” which is, I think, calculated to be very useful. I subjoin a brief precis of important points, which you may, perhaps, think worthy a place in the Journal of the Society.”

Of the four *organic* elements of vegetables; namely, carbon, hydrogen, oxygen, and nitrogen, the carbon is chiefly obtained from the carbonic acid of the atmosphere, thereby setting free the oxygen for the use of men and animals. The hydrogen and oxygen from water; and the nitrogen, on which the nutritive power of plants chiefly depends, from ammonia contained in the atmosphere, which is the receptacle of all the nitrogen of past generations of plants and animals, in the form of ammonia. It is brought down to the earth in rain and snow. Hence their fertilizing property. Animal manure is chiefly valuable for its ammonia. Liquid manure is more valuable than solid, being far richer in nitrogen.

Agriculture differs essentially from the cultivation of forests; the principal object of the former being to produce *nitrogen* in a form capable of assimilation by animals, while the object of forest-culture is confined chiefly to the production of *carbon*. The system of manuring must, therefore, be quite different.

Wheat is composed of starch and gluten, of which gluten alone contains nitrogen. An increased supply of ammonia not only increases the number of seeds obtained from one plant, but also the proportion of gluten to starch, in other words, the nutritive power of

those seeds. Thus, 100 parts of wheat grown on land manured with cow-dung, a manure containing the smallest proportion of nitrogen, afforded only 11.97 parts of gluten; while the same quantity grown on a soil manured with human urine, which is very rich in nitrogen, yielded the largest proportion of gluten, namely 35.1 per cent.

Gypsum, burnt clay, and ferruginous earths promote fertility by possessing the property of absorbing and fixing the ammonia, whether derived from the air, or from manure. Powdered charcoal, diluted acids, &c. etc. have the same effect.

It thus appears that carbonic acid, water, and ammonia, contain the organic elements necessary for the support of vegetables and animals. These very same substances are the ultimate products of the chemical processes of decay and putrefaction. All the innumerable products, therefore, of vitality, resume after death the original form from which they sprang. And thus death—the complete dissolution of an existing generation,—becomes the source of life for a new one.

In addition to the organic, all plants contain, though in small quantities, certain mineral *inorganic* substances, often different in different plants, but generally the same in the same species. Thus, for example, the stems and leaves of all the graminæ invariably contain silicate of potash, while phosphate of magnesia and ammonia are found in their seeds. The alkaline or earthy bases which are found in the ashes of plants in the form of carbonates, existed originally in the plants in the form of salts, that is, combined with vegetable acids, which have been destroyed by the combustion. As certain of these vegetable acids are peculiar to certain species, and constantly occur in them, it may be concluded that they are essential to the development of the species in which they occur; and as they occur in combination with alkaline bases, it is obvious that these bases also are essential to the plants. Each vegetable requires a definite amount of mineral bases to combine with its proper acid, or acids; although one base may sometimes, within certain limits, supply the place of another. In many cases the plant cannot exist without its own proper base and acid. Thus, in wheat straw, silica is the acid, and potash the base; and without these materials, happily present in most soils, wheat cannot thrive. They are as essential to its growth as car-

bonic acid, water, and ammonia. Cow-dung, the most common animal manure, though poor in nitrogen, is valuable for its inorganic contents, namely, potash and phosphates. We thus learn; 1st. That since one plant requires different mineral elements from another, a soil may be fertile for one plant, and sterile for another. 2nd. That an exact analysis of the ashes of every part of a plant will give us a correct knowledge of those mineral substances which are essential to its developement, and which, therefore, must be present in the soil in which we wish to grow the plant. And, vice versâ, an analysis of the soil will let us know for what plants it is suited; and in what elements for particular plants it is deficient. The supply of this deficiency is the true manure for that plant upon that soil. Lastly, we learn, that the exhaustion of soils depends on the removal, in the crop, of the *mineral* elements contained in the plant; for, if these be not restored, the soil retains too little for another crop. Hence the use of allowing land to lie fallow, and of the rotation of *other* crops, which require different mineral bases; both systems giving the land time to recruit the mineral of which it had been exhausted.

The unequal quantities of mineral bases which they contain, shew how one plant may thrive, where others would starve. Thus 10,000 parts of fir wood yield only 83 parts of ashes, of oak 250, of lime 500, of rye 440, and of the herb of the potato plant 1500. In consequence, firs and pines find a sufficient quantity of alkalis in granitic and barren sandy soils, in which oaks cannot grow; and wheat thrives in soils favourable to the lime, because the bases necessary for it, are there found in sufficient quantity.

All kinds of grasses contain in the outer parts of their leaves and stalk a large quantity of silicic acid and potash, in the form of acid silicate of potash. The proportion of this salt does not vary perceptibly in the soil of corn fields, because it is restored to them in manure, in the form of putrefying straw. But this is not the case with a meadow; and hence we never find a luxuriant crop of grass on sandy and calcareous soils, which contain little potash; evidently because one of the constituents indispensable to the growth of the plant is wanting. Soils formed from basalt, graywacke, and porphyry, are, *ceteris paribus*, the best for meadow land, on account of the quantity of potash they contain.

When we increase a crop of grass in a meadow by means of gypsum, we remove in the hay, a greater quantity of potash than can be restored by nature. Hence, after some years, the crops manured with gypsum diminish, from want of potash. But, if this want be supplied, by strewing the meadow occasionally with wood ashes, the grass will thrive as luxuriantly as before.

As every constituent of the bodies of animals and man is derived from plants, all the inorganic parts of the animal organism must be regarded as manure. That which has been abstracted from the soil, in the food of animals, goes, partly to nourish their bodies, and partly is voided as excrements. Those bodies, and those excrements, must, therefore, be restored to the land, if it is to be kept in a permanent condition of fertility. Cow and horse dung do not act so much from the organic constituents they contain, as from their mineral and saline particles. 4000lbs. of fresh, or 1000lbs. of dry horse dung, yield from 100 to 270lbs. of salts and other inorganic substances. These formed the component parts of the hay, straw, and oats, with which the horse was fed, and which are the necessary manure for the formation of fresh crops. Their principal constituents are, the phosphates of lime and magnesia, carbonate of lime, and silicate of potash, the three first preponderating in the corn, the latter in the hay. In 1000lbs. of dried horse dung, we present to a field the inorganic substances contained in 6000lbs. of hay, or 8300lbs. of oats, or sufficient to supply one crop and a half of wheat with potash and phosphates. The peculiar action, then, of the solid excrements of animals, is limited to their inorganic constituents, which restore to the soil that which had been removed in the form of hay, straw, roots, or grain. We could keep our fields in a constant state of fertility, by replacing every year as much as we remove from them in the form of produce; but an increase of fertility can only be obtained when we add more than we take away. For animal manures, other substances containing their essential ingredients, may be substituted. In Flanders the yearly loss is completely restored by covering the fields with wood ashes, of which the greater part consists of the phosphates of lime and magnesia.

Bone manure acts on the very same principle. Every particle of the bones of cattle, like all the other parts of their bodies, has been

derived from the grass, turneps, etc., on which they fed, and consequently from the soil on which the grass grew. 5lbs. of bones contain as much phosphate of lime as 1000lbs. of hay, or wheat straw, or 4000lbs. of the grain of wheat or oats.

Liebig recommends to mix the bone powder with half its weight of oil of vitriol, previously diluted with three or four parts of water, and after maceration for some time, to add 100 parts of water, and sprinkle the mixture over the field before the plough. By this means the phosphates are brought into a soluble state, and the free acids are instantly neutralized by the alkaline bases of the soil, producing neutral salts in a state of fine division, eminently favourable to absorption. In manufactories of glue from bones, great quantities of bone earth, dissolved in muriatic acid, are thrown away. This would be a fine manure.

The best manure for any plant, must be the plant itself. Thus the ashes of wheat straw are the best manure for wheat; and potatoes are best manured with the ashes of potato plants, which are singularly rich in phosphate of magnesia, the characteristic salt of the potato. Of course any other ashes containing the same salt, or any other source of it, will have the same effect. The pure phosphate of magnesia is a splendid manure for potatoes. The substances contained in the grain, or root, must also be restored to the soil in the shape of a manure containing those substances. For instance, the ashes of the straw, will not supply gluten for the grain. Some other manure, containing gluten, must therefore be applied.

As nitrogen is of such importance to grain, and cow and horse dung contain very little of it, we must see how essential it is not to waste any portion of liquid manure, the great source of nitrogen, which must be added to what is derived from the atmosphere, before we can obtain rich crops of nutritive grain. The contents of common sewers, invaluable as a source of nitrogen, are usually wasted. When it is considered that with every pound of ammonia which evaporates, a loss of 60lbs. of corn is sustained, and that with every pound of urine a pound of wheat might be produced, the indifference of agriculturists is quite incomprehensible.

The powerful effects of urine are well known in Flanders; but it is considered invaluable by the Chinese, who use little else for their

corn fields. Were the contents of our common sewers properly treated—mixed, for example, with ashes containing phosphates, and with a slight excess of diluted acids, and then dried up so as to get rid of the water they contain, without permitting the escape of ammonia,—they might readily be obtained free from all offensive odour, and in a form admitting of transportation to any distance. Such a mixture would surpass all manures hitherto tried, as it would contain precisely the elements required for the production of the richest crops of grain, etc. Thus the large towns would be made to give back, in some degree, the stores of nutriment subtracted from the country. Attempts have been made to prepare this manure on the continent, but so ignorantly and unskillfully, that in some cases, the whole of the ammonia has been lost in the process of preparation.

PRESENTATION OF SEEDS COLLECTED AT CABOOL—MODE OF CULTIVATING CLOVER, LUCERNE, AND MELON SEEDS.

Extract of letter from Major T. E. A. NAPLETON, commanding the Hill Rangers at Bhauglepore, dated 9th of March, 1843.

The following is a list of the seeds I am packing up for the Society :—

Lucerne and Clover mixed,	Onion,
The Surdah Melon,	Dhunnia or Coriander Seed,
The Musk Melon of Jellalabad.	and
Beet Root,	Capsicums.

All the aforementioned seeds are quite fresh, and were collected by me at Cabool with great care, and I may add, not without a good deal of difficulty. I was indeed considered very fortunate in collecting any seeds, as the shops in the city of Cabool were all deserted, and the inhabitants had all fled to the hills, which circumstance rendered it exceedingly difficult to procure any thing. It will perhaps be proper to inform you, that a crop of the lucerne and clover now in my garden here, exceeds in health and strength any thing I have ever before seen in India. The ground on which it grows is quite new, and was a complete jungle fifteen days ago, about which time it

was cleared and ploughed. The process I adopted for preparing the seed for sowing was,

1st. The seed was soaked twenty-four hours in cold water, and then sown in beds eight feet long and five broad. In three days it came up abundantly. The ground was watered once before sowing, and again when the seed appeared above ground, or rather when the plant did; after this once a week is the proper interval for watering. It is calculated that the crop will be fit to cut in a month, and that seven or eight crops will be reaped during the year. Thus much for clover and lucerne, except to add, that sheep's dung is the finest manure for forcing or improving the growth of both. Now for the surdah melons and musk melons:—

The seeds to be soaked in cold water for eighteen hours.

2ndly. Put them in a cabbage leaf filled with ashes, and in thirty-six hours they will sprout; and they are then to be sown. The soil should be rich, and ashes and black mould freely mixed.

3rdly. Dig a trench fourteen inches deep, two feet broad, and sow a double row of seeds in each trench. When the plant is a foot high, train it along the dry ridge above the trench, taking care that it does not come in contact with water, the roots only being watered.

4thly. The ground should be watered once before the sowing takes place, then again ten days after the sowing, after which once in five days.

The surdah melon plant is now thriving admirably in my garden here, under the above treatment. Insects have made several attempts to injure the plant, but fresh ashes are carefully sprinkled over them every morning very early, and this drives them away. The beet root of Cabool is unequalled in any part of the world. The onions are very superior, very large, and milk-white, and particularly mild. The dhunnia seed, is so superior in flavour and fragrance to that found in India, east of the Indus, that it only requires to be tasted to have its superiority established. The capsicums are mild, and excellent. I shall be very thankful for a supply of American seeds, as I have nineteen bigahs of garden ground, and devote a great deal of my time to the cultivation of flowers and vegetables. We are about to establish a Floricultural and Horticultural Society here, and I venture to hope, that we shall receive some assistance and information from the Parent Society in Calcutta.

PROSPECTUS, OF A JOINT STOCK COFFEE COMPANY, LATELY
ESTABLISHED AT CHITTAGONG.

Communicated in a letter from ARCHD. SCUNCE, Esq. to the Agricultural Society of India, dated April 7th, 1843

I beg leave to offer for public consideration, the project of establishing a Joint Stock Coffee Company. We all know that coffee grows at this station, and that it grows well. We also know that the produce is good and merchantable. I sent a specimen of coffee, grown by Sheikh Obeydoollah, to the Agricultural Society, and at a Monthly Meeting of the Society this was declared to be good saleable coffee.

2nd. I will state at once the data that leads me confidently to predicate the success of this speculation.

3rd. I premise that $6\frac{1}{3}$ acres nearly are equal to our droon, that 43,560 square feet make one acre, and that 2,76,480 square feet make one droon. In the margin I give the details. It is advisable to plant coffee at least nine feet apart, one bush from another; the utmost space required is twelve feet apart, so that in the one case each plant should have a space of eighty-one square feet to grow upon, and in the other, 144 square feet. I will make my calculation on the largest space.

2,76,480.	
<hr/>	
144=1920.	

4th. Thus each plant being allowed 144 square feet of ground, 1920 plants may safely be allowed to a droon. Instead of separating the plants to the distance of twelve feet, we might stop at ten feet, or as I have already said, nine feet; and in this last case, 3413 plants would go to the droon, but to be on the safe side, I will take only 1920 plants.

5th. It is certainly a drawback to this kind of speculation that the planter must wait several years before he can gather produce. Four years must elapse before we can expect to get any thing considerable or remunerating from coffee; at starting this must be known and acknowledged, and I admit we must make out a good reasonable prospect of ultimate profit to counterbalance the patience that must be extended throughout the progress of this delay.

6th. Mr. Porter states, that the produce of coffee trees is very various, some not yielding more than one pound, others giving, year after year, four pounds; and even some trees have been known to give seven pounds of merchantable coffee in the fifth year of their growth. I will make my calculation at the rate of $\frac{1}{2}$ lb. and 1 lb. per tree

7th. Another matter to be considered is the price. I will not take my data from Mocha coffee, which bears by far the highest price in the market. We may hope to approach more nearly the produce of Mysore and Ceylon. The bond prices of these two sorts, in the London market, were as follows in the year 1840-1 —

Coffee	Month.	Price in 1840	Price in 1841.
Mysore, ..	March	78 to 84	60 to 65
Ditto, ..	October	65 to 78	55 to 70
Ceylon, ..	March.	102 to 115	68 to 75
Ditto, ..	October	80 to 84	65 to 80

For facility of reference, I subjoin the price per pound, so as to be compared with the above rates.—

Price per Cwt.	Price per lb
55, ..	$5\frac{3}{4}d.$
60, ..	$6\frac{1}{4}d.$
65, ..	$6\frac{3}{4}d.$
70, ..	$7\frac{1}{4}d.$
75, ..	$8d.$
80, ..	$8\frac{1}{2}d.$

It will be seen therefore, in the months of March and October of the year 1840, the price of Mysore coffee was not below $5\frac{3}{4}d.$ per lb. and went as high as $8\frac{1}{2}d.$, while Ceylon coffee did not fall below $8\frac{1}{2}d.$, and went much higher. The high price of the latter was probably in a great degree to be ascribed to the more favorable rate of duty at which it was admitted; paying less duty, Merchants could afford better prices.

8th. I shall accordingly assume 6d. a lb. to be the price at which we may import our coffee into the London market, and my calculation takes this shape —

Land.	Plants.	Produce at 1 lb per Tree.	Price at 6d. or 4 As per lb.	Produce per at 1 lb per Tree.	Price 6d. or 4 As per lb.
			<i>Rs. As. P</i>		
1 Droon, ..	.... 1,920	960	240 0 0	1,920	480 0 0
5 ditto, ....	.... 9,600	4,800	1,200 0 0	9,600	2,400 0 0
6 ditto, ....	.... 11,520	5,760	1,440 0 0	11,520	2,880 0 0
8 ditto, ....	.... 15,360	7,680	1,920 0 0	15,360	3,840 0 0
10 ditto, ....	.... 19,200	9,600	2,400 0 0	19,200	4,800 0 0

I have given the above from the best information I possess. In the fourth year, the lowest and safest calculation is, that six droons will give a gross return of Rupees 1,440, while a calculation by no means exaggerated, and which on the contrary is fair and even probable, raises the return upon the same extent of land to Rupees 2,880.

9th. I will now attempt to give an account of the outlay that will be incurred in securing this estimated produce. I have reason to believe, that even the produce of our third year would go far to pay all current expences; but I go on, as before, calculating upon the fourth year —

	<i>Rs per Annum</i>
1 Malee at 6 Rs. monthly,	72
Ditto at 7 Rs.	48
16 Labourers at 2 Rs. and 8 As. each, 40,	480
Total Annual charges,	600
	4
Servants' charges in 4 years,	2,400
Two pair of Bullocks,	60
Two Carts,	40
Kodalees, &c.	50
Malee's Houses,	50
	2,600

Or in four years the total ordinary charges of the four I estimate at Rs. 2,600, and adding something considerably more than ten per

cent. for miscellaneous contingencies, we may state the total outlay at the end of the fourth year to be Rs. 3,000. I consider myself justified in limiting the establishment of servants for five or six

droons to sixteen ordinary coolies, besides two Malees to superintend them.

Some additional outlay may be necessary in selecting a site; perhaps some lands in rice cultivation would have to be purchased, and according as the waste tract selected was more or less free from jungle, the expence of clearing in the first instance would have to be incurred to give assistance to our fixed establishment.

10th. The same establishment would serve us for gathering and preparing the coffee for market; but I find myself at a loss in estimating the subsequent charges of shipment and freight, insurance and sale. I believe what follows, exhibits a fair account of these market charges upon the produce of six droons. I

will first suppose the produce to be 5,760 lbs. saleable at Rs. 1440. Then I allow as follows:—

	Rs.
Shipment charges on an Invoice price of 1,500 Rs., } at one per cent. amounts to, }	15 0 0
Freight on 5,760 lbs. say $2\frac{1}{2}$ tons at 50 Rs.,	125 0 0
Engaging do. on 1,500 Rs. at $2\frac{1}{2}$ per cent,	8 0
Insurance, say at 5 per cent,	75 0 0
Effecting ditto, $\frac{1}{2}$ ditto,	7 8 0
Total Shipping charges,	260 0 0
Add English charges, as above, Minus freight,	135 0 0
Total Sale charges, India and Europe, (27 per cent.)	395 0 0

Thus deducting 395 Rs. from a market out-turn of 1,440 Rs., we should have 1,045 Rupees clear for the fourth year of our undertaking to carry to the books of the Company—a return of 1,000 Rs. upon an outlay of 3,000 Rs., amounts to 33 per cent. for the year, and much exceeds 10 per cent. of the disbursement of each of the four

Year.	Out	10 per cent In	
1st Year,	800	80	
2nd ditto,	1,400	140	
3rd ditto,	2,000	200	
4th ditto,	3,000	300	
Interest at 10 p. cent for 4 years, 720			

years. But it will be remembered that a produce of 11,520 lbs. upon six droons is fair and moderate, and it is proper to consider also how the Sale charges would affect this out-turn. I would allow as follows:—

Shipment Charges on an Invoice, price of 3,000 Rs. at 1 per cent. amounts to	Rs. 30
Freight on 11,520 lbs. say 5 tons at 50 Rs.,	250
Engaging ditto on 3,000 Rs. at $2\frac{1}{2}$	75
Insurance at 5 per cent.,	150
Effecting ditto at $\frac{1}{2}$ per cent.	15
Total Shipment charges,	520
Add English charges as above, Minus freight,	270
Total Sale charges, India and Europe,	790

Now deduct 790 Rs. from 2,880, Rs. which I assume to be the price of 11,520 lbs. of coffee at four Annas a pound, and the clear return to the Company, at the close of the fourth year's operations, is 2,090 Rs..

11. Or if this last calculation be too sanguine for the fourth year, consider the position of the projected Company at this juncture. The fifth year is beginning, the infancy of our undertaking is past, our days of watching tender trees and gathering short crops are over; and now we are assured of full returns. On an average, suppose the produce to be one pound a tree, then as above, six droons will give 11,520lb. saleable at Rs. 2,880.

Price of 5th year's produce, (27 per cent)	Rs. 2,880
Deduct Sale charges,	= 790
	2,090
Deduct Servants' wages, 5th year,	Rs. 600
Deduct Contingencies,	190 = 790
Net return of fifth year,	Rs. 1,300

and supposing the total outlay at the end of the fourth year, namely, 3,000 Rs. to be the capital sunk and invested, this net return of 1,300 Rs. is equivalent to an unfailing income of 43 Rs. per cent.

12th. I will put the matter in another light, the total outlay at the beginning of the fifth year is 3,000. Rs. The money is gone, but we can shew for it a property which gives a net income of 1,300 Rs., and I take it, that if instead of going on with the concern, the Com-

pany were to sell their property at the beginning of the fifth year; they would realize readily 6,000 Rs. Many here are much more capable of judging than I am, whether a sure return more than 20 per cent. (increasing annually, and annually becoming more secure), would not be a good investment of capital.

13th. Having thus sketched the working of a coffee plantation, I will venture to suggest the conditions on which a Company may be formed. It is already seen, that my scheme is of limited extent - throughout four years my estimated outlay does not exceed 3,000 Rs., and the resources of the Company need not be superfluously provided. Well then I recommend that we should begin with a capital of 6,000 Rs., divided in 120 shares of fifty Rs. each. This capital should be at once paid up, and half of it should, I think, be invested in the Five per Cent Loan. The remaining half will be available for current disbursements.

14th. The investment of 3,000 Rs. in Government Securities, I had in view when I made my calculation of charges. it will give 150 Rs. per annum, either to reduce my estimate of costs, or to meet extra contingencies, which perhaps must be expected.

15th. I have purposely restricted the operations of the Proposed Company, in order that no capitalist might be deterred from lending his aid by consideration of risk and responsibility; and it is evident that at any convenient period, the second or third year for instance, our capital might be enlarged by raising forty or fifty, or more additional shares.

16th. The main object of the Company should be the cultivation of Coffee; but I for one would give my opinion and assistance for undertaking carefully-conducted experiments of sugar and hemp. I would not launch out the funds of the Company on problematical chances: the cultivation of sugar is almost beyond the chance of failure. but at any rate, I am confident, that the experiments indicated, may safely be left to the prudence and intelligence of the Directors whom the Shareholders would appoint. Perhaps it is not generally known here, that the common gunjah plant of India is the real Europe hemp. The apparent difference between the two plants, Indian and European, is entirely owing to the cultivation. Gunjah grown as a drug is planted at wide intervals, so that each plant may

throw out many branches, and a large crop of leaves, flowers, and seeds : whereas the hemp plant for cordage should be closely and thickly set, in order that the plant may be thin and tapering.

REMARKS ON AN ESCULENT VEGETABLE, NAMED THE "POTATOE CREEPER"—CULTURE OF THE HOP AND STRAWBERRY AT BANGALORE.

Communicated in a letter from T. C. SMITH, Esq., Assistant Surgeon, Bangalore, dated 7th March, 1843.

The "Potatoe Creeper," alluded to in your letter of February 22d, is rather a curious plant, and might be extensively introduced into India, as an article of diet in case of famine; its productiveness is extraordinary. The tubers and fruit are both esculent, the former weighing 7, 8, and 10lb., frequently, each. I think it was first brought to Madras from some of the South Sea Islands. It should be planted like potatoes in a light rich soil: but requires a pandal to support the vine when laden with fruit, each plant should be about three feet apart to give sufficient room for the roots. The tubers are too large and weighty to send by bangy; but if I can procure you some of the fruit, I will send it in a few days;* if not, I must wait till the next crop, which will not be ripe for two months. Both fruit and tubers sprout about two months after being gathered, when they should be planted: they are then about four months coming to maturity, so give near two crops annually. I do not think it is a nice vegetable, it is rather like a soft yam.

The Hops grow perfectly well, and are propagated with great ease by cuttings; but of what use is it? The natives will naturally not take it up, as they have no hope of a return. I could supply plants to any extent. I sent a box up last year with three dozens plants to some German Missionaries settled somewhere in the Nerbudda territory; the plants got to Nagpoor alive and well, but on reaching their ultimate destination, the poor Missionaries had died of fever.

The Strawberry is cultivated by the natives all round the cantonment, and is sold at this season as cheaply and as abundantly as in

* Since the receipt of this communication, Dr Smith has despatched a few bulbs, which have been planted out in the Society's Nursery Garden.

London. But we have only one sort, the *Hautboy*. Can you oblige me with some seed of any other sorts that you have acclimatized in Bengal? For English seeds are perfectly useless here. They never vegetate, however fresh we may get them, but if acclimatized first at the Cape, they thrive very well. This is curious, and a fact that I am not very well able to account for. When I say they never vegetate, I mean, that they rarely, if ever, come to perfection.

[A small supply of Tinnevely Senna Seed having been placed at the disposal of the Society, through the kindness of Mr. James Cowell, merchant of this city, the Committee of Papers consider, that a reprint of the following practical remarks on the culture and preparation of the plant, from the pen of Dr. Robert Wight, will be useful to parties desirous of making experiments with the seed.]

Practical remarks on the Culture and Preparation of Senna in the Madras territories

MY DEAR SIR,—As you requested, I have looked carefully over Dr. Wallich's notes on the *Cassia lanceolata*. With the exception of a few brief instructions for cultivation, I find it a purely botanical account, examining first the synonymy, and concluding with a minute and accurate description of the plant itself. A paper of that kind, coming as it does from the *Magnus Apollo* of Indian Botanists, leaves, so far as it goes, no room for remark. Since, however, it is your intention to reprint it in the *Madras Journal*, the following additions may prove useful to those, who either are, already, engaged in its cultivation, or who may contemplate speculating in that way: and here I may remark that, considering the ease and certainty with which this drug can be raised and prepared for the market and its vast consumption both in India and Europe, it seems to promise a very large return to the speculator. The consumption in Europe alone is stated by Mr. Royle, (*Illustrations of Botany, &c.*), to amount to four millions of pounds, that of India it may be difficult to determine, but it is well known that the natives are in the habit of using largely the indigenous, broad pointed leaved kind, though said to be much inferior, which would, as a matter of course, give place to the better sort, if as easily procurable. This I think would soon be the case, if the cultivation was extended, as it has already become so.

completely naturalized in the Tinnevely district, as to be met with, in many places, as a common weed. It possesses besides the power of resisting heat and drought to an astonishing extent. I have seen it, during the hottest season, in full bloom and luxuriance, on old stone walls, and on soils so dry that no other herbaceous plant could survive, and where vegetation, in the arboreous plants seemed nearly, if not altogether arrested by the heat and long prevalence of strong land-winds. This fact (as shall be afterwards shown) is well worthy of attention.

In Tinnevely, the only district, I believe, in Southern India, where it is cultivated to any extent, the soil employed is of a grey alluvial kind, or such as, at some former period, has been under wet cultivation, consisting of a mixture of sand and clay. I also saw a field of it in the bed of an old tank, the soil of which was such as above described.

The ground is first well ploughed, to loosen it thoroughly, and clear it from weeds. The sowing usually commences in December, towards the end of the rains, to give the seed the advantage of the last showers of the season to make it vegetate. It is sown in rows about 18 inches or two feet apart by dropping two or three seeds into holes about an inch deep, and a foot and half distant from each other. If rain fails, nothing further is required, if not, they are watered two or three times to promote germination.

When the plants have attained the height of two or three inches, the ground is loosened about the roots and well weeded. Should the season prove very dry, and vegetation seem to flag, they are again watered; the rule being, that the larger the leaves, the better the quality; hence they are classed into first, second, and third sorts, according to that criterion. In about six months the leaves are considered fit for gathering, which is known by the spike of flowers being produced, but the flowers not yet opened. Three gatherings are taken, the two last at intervals of ten or twelve days, when the crop is finished, and the plants no longer considered capable of producing a marketable article; they are then allowed to ripen their seeds for next season. Some skill is required in gathering, to effect that operation economically, and at the same time without injuring the plants. The *Senna* bears $\frac{1}{2}$ pinnate leaf, that is, one having a centre

stalk with a number of leaflets (6 to 10) on each side. The object is to remove these, leaving the stalk attached to the bush. To accomplish this the lower end of the stalk is gently laid hold of, from below, between the finger and thumb, and the leaflets stripped off into the hand, by drawing the fingers along the stalk. In this way the bushes are rapidly cleared of their foliage, and no unintentional admixture of pods or other impurities can possibly occur. In about twelve days the second crop of leaves is fit for gathering, and in twelve or fourteen days more, the third and last is plucked.

The most important part of the process yet remains—that of drying, for, unless properly dried, both its commercial value and medicinal properties are deteriorated. Two methods have been tried, namely, exposure to the heat of the sun, and to a current of air in a dark room. The former is said to be the method pursued in Egypt, the latter is the plan adopted in Tinnevely—at least so I was told, but, at the same time, with such evident reluctance, as to leave a doubt on my mind as to its being really a true statement. I have now, however, no doubt on the subject, for on examining two specimens, one from Bombay, the other from Tinnevely, the difference was such as to prove, not only the truth of the statement, but the infinite superiority of sun-dried leaves. The colour of the Bombay or Egyptian sample was a very pale green, nearly white, the leaves narrow, thick and leathery, or coriaceous, somewhat brittle, and having the smell of well prepared hay. The Tinnevely one, was of a light pea green colour, very thin, membranous (from excessive luxuriance?), flexible, and having a sour, vinegar-like smell, as it had undergone the acetous fermentation while drying. Another indication of the same thing may be found in the great loss of weight the latter sustains in keeping. Again—samples of two sorts of *Senna* raised in this country from Tinnevely seed, the one dried in the shade, the other in the sun, were infused in equal quantities of boiling water, the former produced a pale, the latter a deep purplish brown infusion, corresponding in these respects with infusions of Tinnevely and Egyptian samples. The former is less active, soon decomposes, and acquires a sour smell and a muddy opaque colour, while the other retains for many days, under similar circumstances,

its transparency, and without undergoing decomposition. These facts, I think, are quite conclusive, and show, in a striking point of view, the advantages of sun-drying, considered in relation to medicinal properties only. But that is not all, it is well known that Egyptian Senna is largely adulterated, but is notwithstanding a more efficient medicine than the pure Tinnevely drug, a difference, which the preceding experiments prove to be, partly at least, attributable to the mode of drying, though other circumstances may contribute to produce this effect. Is the difference altogether attributable to the mode of preparation? or partly to the Egyptian Senna being adulterated with more active ingredient? or to the operation of some other cause yet undiscovered?

These are questions of importance, and merit the fullest investigation, both in a medical and commercial point of view. If the comparative inactivity of the Tinnevely Senna is owing to the first cause, the cure is simple, and the advantages, commercially, very great, since the cost of preparation, both in time and outlay, must be materially lessened by the rapid and unexpensive process of sun-drying, as compared with the slow and more costly one of fitting up dark apartments. If it is in any degree owing to the admixture of other kinds of Senna leaves we have an indigenous species to supply them, and, lastly, if owing to the quality of the soil or culture, the subject still remains for investigation.

I shall now make some remarks on what I consider the defective points of the Tinnevely mode of cultivation, and suggest some alterations tending to diminish the cost of production, and probably to improve the quality of the produce.

The lands appropriated in that district to the culture of Senna, are of a very expensive description, while it does not by any means appear certain that they are the best, since, by giving a tendency to excessive luxuriance, it is probable the due elaboration of the active principles of the plant is prevented, and mucilage formed; to which its diminished activity and greater tendency to fermentation may be mainly owing. Bearing in mind its power of resisting heat and drought, it will perhaps on this account be found, that the much cheaper, light sandy soils of the sea coast, and along the banks of rivers (now extensively appropriated to the cultivation of Indigo) are

better adapted for its culture. The similarity, indeed, in many respects, of the Indigo plant is such, as to give us reason to believe, that any soil found suitable for it, will answer for Senna. Commercially speaking, it is of importance to determine, whether the drug produced on cheap and easily wrought soils has its active properties increased or diminished. I would, therefore, recommend attention to this subject, since, if the former is found to be the case it will probably materially diminish the cost, and fit it for the consumption of the Indian markets; the Tinnevely Senna being nearly 500 per cent. dearer than the Egyptian or bazar Senna.

I have mentioned above, that only one crop of three gatherings, lasting through a period of about one month is procured from each plant, after which it is no longer considered fit to produce a marketable article. Mr. Royle informs us, that he raised at Seharunpore some plants from seed picked from a parcel of bazar Senna. A figure of the plant, proves its identity with the one cultivated in Tinnevely, while its medicinal properties were ascertained by experiment, to be equal to the best any where grown. He, in collecting the crop, in place of gathering the leaves as practised here, cut down the whole bush. Some sown early in March "were cut down three different times, and always threw out a profusion of new branches, so that several crops were procured from the same plant in one season." The vegetation of some that was sown later, seemed only stopped by the accession of the cold weather. A combination of these plants might prove eminently productive, for, by sowing earlier, say in August and September, the first crop might be gathered in February or March, the plants might then be cut down, the soil slightly ploughed and manured between the rows, and watered; when a second crop might be expected about the usual time of gathering the first, according to the present practice; and perhaps, as many as four crops might thus be obtained from the same roots, as they would be extending and strengthening after every cutting! This is the method adopted with Indigo, and I can see no reason to apprehend failure in the case of Senna, while it might be the means of effecting so great a reduction in the cost of production, as would enable it not only to compete with on equal terms, but even to undersell, the Egyptian article in this country, and, from its greater

purity, give it a decided advantage in the highest market where it now brings a very high price.

In conclusion, I beg to add, that, though these notes are somewhat hurriedly written, they are not the suggestions of the moment. It is now a year since I had an opportunity of inspecting the Tinnevely plantations, and I have since then repeatedly thought of drawing up a much more elaborate account of this cultivation than the present Brief, however, as these hints are, I believe them amply sufficient the simplicity of the culture of the plant, and of the preparation of the leaves, rendering more detailed instructions unnecessary while the mere circumstance of having called attention to the subject, pointing out the advantages likely to accrue, will I hope prove an adequate stimulus to those who have the opportunity of extending the cultivation of this article of almost general consumption. India now imports perhaps not less than between three and four hundred thousand pounds weight of Senna annually, of which in 1831 she re-exported to England upwards of 200,000lbs. the whole of which she might, with ease, produce within her own territories, and mostly from lands now lying waste, and with the additional advantage, that the collection and preparation would afford employment to all classes of cultivators, at those seasons when most other field labours are at a stand.

With respect to the indigenous Senna (*Cassia Burmanni*, Wall.) I fear it is not so well known as it ought to be among Europeans, since it possesses very considerable medicinal properties, and is much used by the natives; who, to increase its activity, add a small portion of castor oil to the infusion, much in the same way as we add Epsom salts. It is a common and widely distributed plant in arid pastures and wastes, but by no means a conspicuous one, from the circumstance of its lying flat on the ground. In the hope of making it somewhat better known, I shall endeavour to procure recent specimens, and prepare a figure for your next number, which is the more desirable, as it may generally be procured in almost any part of the country, and might prove a useful substitute for the more approved lance-leaved species, or may perhaps be advantageously combined, as in Egypt, on the well-known principle, that two medicines, possessing similar properties, act better in combination than

either separately. Leaving this point, however, to be settled by those who have opportunities of subjecting both kinds to the test of experiment.

I remain, &c..

Yr. Sec. &c.

ROBERT WIGHT.

From the Madras Journal of Literature and Science, No. 15, April 1843

*General Observations on Indian Sheep.**

A large portion of the covering of Indian Sheep is mere hair, and nearly the whole of the Native fleeces are interspersed with black or grey hairs, (arising from many of the flock being party-coloured,) this alone is a very great objection to the consumer of the article, as such wool cannot be beneficially applied to the manufacture of any description of goods, but those which are either mixtures or dark colours: but when pure white, it can be consumed indiscriminately. We have dilated on this point, to shew the necessity of rejecting all sheep that have not pure white fleeces.

There is another imperfection in the fleeces of Asiatic sheep, they almost invariably abound with what is technically called, "*kemp hair*," that is, a bright spiky hair which is not serrated like the hair of wool, consequently, being deprived of that requisite adhesive property cannot unite, but appear conspicuous in every article whatever consumed, and cause the application of the Wool to be confined to the manufacture of the most common description of Woollen goods, whereas, if the fleeces were divested of the black, grey, or kemp hairs, the wool would be enhanced in value 20 to 25 per cent. Prudence, therefore, dictates, that the fleeces of the flocks should be annually examined, and all those which retain the greatest portion of any of the above defects, should be extirpated, or rejected from the establishment.

The same minute attention should also be paid to the selection of sheep when purchased, taking due care to choose those whose fleeces are most free of the above defective qualities.

* This valuable paper was inadvertently omitted in the compilation of the last "Annual Report of Transactions." It was furnished by Messrs. Thomas Southey and Sons, on the occasion of their reporting on some musters of Government Wool sent home by the Chamber in 1811, per ship *Cambrian*.

In conclusion, we beg further to notice, that in the event of English Rams being resorted to for the purpose of ameliorating the fleeces of the Indian flocks, augmenting the weight of their fleeces, and through their instrumentality, of extirpating the fault pointed out in the Indian fleeces, we recommend due care and attention being paid to the quality of the fleeces of the Rams; this has hitherto been very generally disregarded. Orders are usually given for sheep to be purchased of celebrated breeders in a country, whose name is familiar from their having succeeded in rearing sheep of perfect symmetry, and such as speedily fatten; this is sought and obtained, without regard to the quality of their fleeces, and which are most commonly of a coarser quality, arising from their being higher fed.

We beg to offer the following, attention being paid in selecting the Rams; viz.

That the choice should be made in the month of May, or June, just before they are shorn, and a few taken from one flock, and a few from another, confining the choice entirely to the age of the Ram and quality of the fleece, of which there is at least $1\frac{1}{2}d.$ to $2d.$ per lb difference in the quality in the generality of fleeces.

(Signed) THOS. SOUTHEY AND SONS.

30th November, 1842.

[From the Report of the Bombay Chamber of Commerce,

for the Second Quarter of 1842-43.]

General Principles applicable to the Management of Fruit Trees.

Standard fruit trees occasion less trouble in managing, and are more certain in bearing, than either wall trees or espaliers, though there are some trees, as the peach, which are too tender for being grown as standards; and others, as the vine, which are unsuitable. In standard trees, the top will generally be adjusted to the root naturally; and hence, in such trees, very little pruning will become requisite beyond that of thinning out crossing or crowded branches; but, in wall and espalier trees, as the top is disproportionately small to the roots, pruning, or disbudding, etc., as a substitute, becomes necessary during the whole period of their existence. The nearest approach which a wall tree can be made to have to a standard

is, when, in the case of north and south walls, one-half of the branches are trained on the east side of the wall, and the other half on the west side; or when one tree is made to cover both sides of a double espalier. Pruning may be rendered almost unnecessary by disbudding, disleafing, and stopping; but this will not always be the best course to pursue. When the root of a wall tree is to be strengthened, more shoots should be left than are required for being laid in at the winter pruning; and when the root is to be weakened, all or a part of the shoots produced may be left, but they must be disleafed or stopped as fast as they advance in growth, or the stem may be ringed, or the young shoots twisted or broken down, or the roots pruned.

Keeping roots near the surface, and encouraging the production of surface roots, will have a tendency to moderate the production of wood; and deep planting and stirring the surface to a foot or more in depth will throw the roots down to a moister stratum, and encourage the production of wood, but of an inferior quality for the future production of fruit. Dry sandy soil, not rich, will produce moderate growth and precocity, both in the fruit and the ripening of the wood, and rich deep soil the contrary; hence dry soil, comparatively poor, ought to be preferred for cold late situations, in which it is always desirable to ripen early both the fruit and the wood. By depriving a tree or a plant of its first crop of buds, a second crop will be produced the same season, but some weeks later; and, on this principle, late crops of leaves may be produced on all plants, and of fruits on all such trees and plants as have the power of forming blossom-buds, and expanding them in the course of one season; as, for example, the raspberry, strawberry, grape, and all annual and biennial fruit-bearing plants whatever. As all plants require a certain period of rest, by bringing on this period sooner in autumn, by disleafing, and depriving the roots of moisture by thatching the ground over them, they will be predisposed to vegetate sooner in spring. Hence the advantage of pruning all trees, the young wood of which is not liable to be injured by frost, immediately after the fall of the leaf. All wood that is not thoroughly ripened should be protected during winter by branches, fern, hay netting, or some other means, but, as this is only applicable to wall trees, the soil for

all others should be so adjusted to the climate as to insure their wood ripening in the open garden or orchard. As the most exhausting part of every fruit is the seed, and as the number of seeds in every fruit is limited by nature, it follows that a few fruit grown to a large size will be less injurious to a plant than the same weight of fruit produced in fruits of small size. As in plants in a state of seed-bearing the chief energies of the plant are directed to the nourishment of the seed, so in those fruit-bearing plants in which the fruit is gathered green, such as cucumbers, gourds, capsicums, peas, beans, kidneybeans, etc., none of the fruit should be allowed to mature any seed so long as any of it is gathered in an unripe state. Hence the immense importance of thinning out the blossom-buds of trees before they expand, and thinning out the fruit before the embryo of the seed begins to assume that stage which in berries and pomes is called setting, and in nuts and stone-fruit stoning. When a fruit is once set or stoned, if the embryo of the seed be destroyed by the deposition in it of the eggs of an insect, or by the puncture of a needle, the fruit, if it does not fall off will ripen earlier, but will be in most cases of inferior flavour. The same result will take place to a limited extent even with leaves, when they are punctured.

Any check given to the head of a tree, such as disleafing, the attacks of insects, disease, overbearing, etc., has a tendency to cause the plant to throw up suckers, if it is natural to the root or stock to do so. As the leaves produced at the base of a young shoot are small, and generally soon drop off, so the buds in the axils of such leaves are never blossom-buds till they have become invigorated by at least another year's growth; and hence, when young wood is shortened, if blossom is the immediate object, it ought not to be cut farther back than to the first large bud. This is particularly applicable in the case of vines, roses, etc. In shortening such wood on spur-bearing trees, such as the apple and pear, only one or two of the imperfect buds are left at the base of the shoot, and these the following year generally become blossom-buds, if the tree is neither too weak nor too luxuriant. In general, winter-pruning a young tree retards the period of its fruit-bearing, but greatly increases the vigour of the tree; hence delicate trees, such as the peach, require more pruning than very hardy trees, such as the apple and plum.

“Summer pruning,” a friend observes, “effects various objects: it exposes the fruit, where it exists, and also the embryo fruit-buds, and leaves connected with them, to the beneficial influence of light, air, and dews. This is effected by removing those portions of shoots which, as they advance, would more and more shade the lower parts and prevent them in a great measure from deriving advantage from the above important agencies as regards vegetation: these may be termed mechanical effects. Physiologically considered, the progress of the sap is limited by summer-pruning, and is directed towards the leaves and buds on the lower parts of shoots, which are in consequence invigorated, more especially as their free exposure to light, &c., enables them better to elaborate this increased supply. But although the foliage so left to act is increased in size and efficiency, yet the agency of this portion in producing roots is, notwithstanding, less powerful than the whole mass would be, if the shoots were allowed to grow wild throughout the summer; for in proportion to the mass of healthy foliage, so is the increase of roots. Hence excessive vigour is moderated by summer-pruning, and this in a greater or less degree according to the time and manner of performing the operation. The longer the operation is deferred, and the less the portion cut off from the shoots, the greater will be the strength which the roots will derive; and the earlier and shorter the shoots are cut, the less will be the quantity of foliage, and proportionally so the quantity of roots. Therefore, if a tree is too vigorous, summer-pruning should commence by disbudding such shoots, as they appear, as are not at all wanted to be retained for wood or spurs; and, as soon as the shoots intended to produce fruit spurs or buds at their base have become furnished with five buds, the extremity may be pinched off. As many as five buds are mentioned, because fewer do not complete one turn of the spiral, which may be traced by following the arrangement of the buds on a shoot of such fruit trees as are usually trained on walls. In the course of a fortnight, the uppermost buds on the portion left will have commenced to push; and they must be allowed to go on for a longer or shorter time without stopping, according to the greater or less danger of the buds at the base being also developed into shoots, instead of remaining in the character of fruit buds till next spring. If the roots, and

MANUFACTURE OF SUGAR, FROM THE STALK OF MAIZE OR INDIAN
CORN.

At a meeting of the Linnean Society, held on the 21st February 1843, a paper was read from Professor Croft, on the manufacture of sugar from the corn stalk, (*Zea Mays*). From late experiments in Indiana, it appears that the corn stalk is capable of producing sugar. The juice of the stalk contains more than three times as much sugar as the beet, and five times more than the maple, equalling, if not exceeding, that of the ordinary sugar cane, as raised in the United States. The sugar is more easily obtained from the corn-stalk than from the sugar-cane, and the cultivation of the former is much easier. The sugar-cane is 18 months in coming to perfection, whilst the corn-stalk requires only from seventy to ninety days. The refuse of the maize, after the expression of the sugar, forms an excellent fodder for cattle. The quantity of sugar is said to be increased by removing the ears of the corn during its growth.—*Gardener's Chronicle*, 4th March, 1843.

Monthly Proceedings of the Society.

(*Wednesday, the 8th. February, 1843.*)

The Honorable Sir J. P. Grant, President, in the Chair.

(ELEVEN MEMBERS PRESENT.)

The Proceedings of the General Meeting of the 11th January, and of the Special Meeting of the 18th January, were read and confirmed.

Members Elected.

The Gentlemen proposed at the last General Meeting were elected members, viz.

Messrs. D. H. Kearnes, Samuel Bowring, James Curtis, Rajah Ramchund Sing, Capt. Rogers, Captain Clapperton, Messrs. Spencer • Judge. James Small, R. Cruise, and Dr William Griffith.

For Election

The names of the following gentlemen were submitted as candidates for election.—

The Rev. James Sharpe, Benares,—proposed by the Honorary Secretary, seconded by Mr. Wm. Storm.

A. Sawers, Esq.,—proposed by Mr. James Forlong, seconded by the Honorary Secretary.

Joseph Agabeg, Esq., Merchant, Calcutta, —proposed by Mr. A. Parker, seconded by the Honorary Secretary.

Edward Blyth, Esq. Curator Asiatic Society's Museum,—proposed by Dr. Hufnagle, seconded by Mr. L. Balfour

Capt. Fred. Elvæll, (Thuggee Dept.)—proposed by Dr. Hufnagle, seconded by Mr. Balfour.

Nelson Howard Esq., Merchant, Calcutta,—proposed by Dr. Hufnagle, seconded by Mr. Balfour.

Capt. T. F. B. Beatson, 10th Cavalry,—proposed by Dr. Hufnagle, seconded by Mr. Balfour.

George Wood, Esq., of Calcutta,—proposed by Mr. W. G. Rose, seconded by Mr. W. Storm.

Kenneth McLeod, Esq., Doabah Factory, Chupra,—proposed by Mr. Rose, seconded by Mr. Storm

Presentations to the Library.

1 Report of the Chamber of Commerce for the first quarter of 1842-43.—*Presented by the Chamber.*

2 The Planter's Journal, No. 29 to 32.—*Presented by Mr. Speede.*

3. The Literary Gleaner, No XII. of Vol. I.—*Presented by the Proprietor.*

Museum.

1 A specimen of Carolina paddy, grown at the stock farm of Messrs. Ahmuty, Clark and Co., in the neighbourhood of Calcutta.—*Presented by Mr. John Clark.*

Mr. Clark mentions, that the above is an average specimen of three and a half maunds of seed, the produce of twenty seers of Carolina.

paddy, which he procured from Messrs. Haworth and Hardman, by whom a large consignment was received direct from America. Mr. Clark further states, that the seed was sown, *one month* after the usual time of sowing, in ground highly impregnated with saltpetre.

The Secretary informed the meeting, that it was from the consignment alluded to by Mr. Clark, that the Society, in the beginning of last August, had purchased upwards of sixty-seven maunds of seed, of which forty maunds had been distributed in the Province of Behar, and the remainder over other parts of India. The Society had not as yet, been favoured by any of its correspondents, with the result of their experiments, but he hoped to have the pleasure of submitting some communications on the subject hereafter.

Although, from the disadvantages referred to, the quantity of seed reaped by Mr. Clark was small, yet, on a comparison of the specimen with some of the original seed in the Society's possession, it was proved, that very little deterioration of the grain had taken place. It was agreed, that a trial with the seed contained in this specimen should be made in the Society's Nursery, with a view of determining if any further deterioration would result in the second generation.

2. Two bags of South American cotton seed — *Presented by Mr. T. S. Kelsall.*

Mr. Kelsall intimates, that this seed was received direct from Perambuco. It is placed at the disposal of the Society for distribution to such parties as are inclined to make experiments for the improvement of the cotton of India.

3. Five samples of cotton grown in Bundelkund from indigenous seed. — *Presented by Dr. Henry Sill, Civil Surgeon at Humeerpore.*

The Secretary stated, that from a report which Mr. Willis had kindly furnished, it would appear that the general character of these samples is unfavorable, the staple being weak, irregular and curly, and the cotton most tenacious of the seed. The value of the best specimen is estimated at from 3½d. to 4d. per lb., while the worst would not realize more than 2½d. per lb.

4. A few pods of cotton, the produce of Tennessee seed received from the Society, and put into the ground during the last rainy season. — *Presented by Mr. G. T. F. Speede.* (For Mr. Speede's letter, see "Correspondence and Selections," page 62.)

5 A small specimen of silk reeled from the Cocoons of the *Bombyx* worm.—*Presented by Dr. George Eveleigh* (For other particulars, see body of the Proceedings.)

6 A further supply of seed of the *buakam* or sapan tree, (*Casalpinia sapan*.)—*Presented by Dr. Strong*

Dr. Strong forwards this supply for distribution, as the tree is not only a valuable wood for its dye, but forms a good prickly hedge or boundary, for fields.

The late increase of Subscription

The motion of which previous notice had been given by Mr. Hurry and seconded by Mr. Heatly at the last General Meeting, to the effect that "The question of the late increase of the Subscription be reconsidered," was then brought forward. In the absence of the mover and seconder, Mr. W. G. Rose adopted, and Mr. Speede seconded the motion.—

Mr. Piddington proposed the following amendment to the above motion.

"That a detailed statement of the Society's expenditure and income for the past year, and an estimate for the year 1843, be drawn up by the Finance Committee, with an equal number of Members added to it, and be submitted by circular to the Mofussil Members, with a request, that they do express their views as to the management for the Society's business by a paid or Honorary Secretary, with reference to the new rate of Subscription."

In the absence of a seconder, the amendment was not entertained, whereupon the original motion was put, and carried.

Mr. Speede begged to give the following notice of motion for the next General Meeting:—

"That the funds of the Society not appearing to require the increased Subscription of eight rupees annually for support of the Monthly Journal, the former rate of Subscription of two gold mohurs annually be reverted to."

Election of a Vice President, and revision of Standing Committees.

The Honorable the President stated, that the next subject for consideration was the election of a Vice President in the room of Dr. John Grant, who had proceeded to Europe, and the filling up of a

few vacancies in the Standing Committees. With reference to the first mentioned vacancy, he would propose, if it should meet the approbation of the meeting, that William Griffith, Esq., be elected to the office of a Vice President of the Society. The proposition was accordingly put to the vote, and carried unanimously.

The President next stated, that the departure of Dr. Grant had likewise created a vacancy in the Committee of Papers. There was also a vacancy in the Nursery Committee, in consequence of the resignation of Dr. Mouat, from his want of leisure to attend to the proper discharge of the duties connected therewith, and a third vacancy in the Coffee and Tobacco Committee, owing to the departure of Mr. Thomas Leach.

It was then proposed by the President, seconded by Mr. Storm, and unanimously agreed to, that Dr. Griffith be requested to fill the vacancies in the Committee of Papers and Nursery Committee.

It was further proposed by the President, seconded by Mr. Staunton, and carried unanimously, that Mr. Piddington be requested to become a Member of the Coffee and Tobacco Committee.

The following is the list of Standing Committees for the current year :—

Sugar.—Messrs. G. U. Adam, G. F. Hodgkinson, John Allan and H. Piddington.

Cotton.—Messrs. Joseph Willis, Chas. Huffnagle, W. Earle, G. Adam and Robert Smith.

Silk, Hemp and Flax.—Messrs. R. Watson, J. Willis, C. K. Robison, G. F. Hodgkinson and Baboo Ramcomul Sen.

Coffee and Tobacco.—Drs. Wallich and Strong, and H. Piddington.

Implements of Husbandry.—Major Forbes, Messrs. C. K. Robison and Chas. Huffnagle, Baboo Ramcomul Sen and Rajah Radhakant Deb, Bahadoor

Caoutchouc and Oil Seeds.—Drs. Wallich and Corbyn, Baboo Ramcomul Sen, Rajah Radhakant Deb, Bahadoor, and Dr. Downes.

Improvement of Cattle.—Messrs. Chas. Huffnagle, C. Prinsep, W. P. Grant, C. K. Robison, and W. Storm.

Nursery Committee.—Dr. Wallich, Messrs. Chas. Huffnagle and William Storm, Drs. Downes and Griffith.

Committee of Papers.—Dr. Monat and Griffith, and M. A. Big-nell

Finance Committee.—Messrs. Huffnagle, Staunton, and Baboo Ramcomul Sen

General Committee.—Dr. Strong, Baboo Radhamadhub Banoorjee, Messrs. Willis and W. Storm

The Secretary, is *ex-officio*, a Member of all Committees

Horticultural Exhibition—Formation of a Kitchen and Fruit Garden Committee.

The Secretary submitted a list of the Prizes which were awarded to the native gardeners at the exhibition of European vegetables, held at the Town Hall on the 26th January. The list exhibits the names of 38 gardeners, to whom money Prizes to the amount of 200 Rupees, and seven silver Medals were given. It is stated, that the show was altogether a very good one, and superior to that of last year.

On the conclusion of the reading of the above paper, Mr. Speede drew the attention of the meeting to the benefits that might result if the Society were to give Prizes at different seasons, instead of limiting itself to a single show in the cold season, and the Secretary suggested it might be well to do away with the annual show, and have one quarterly. Mr. Speede proposed, that a distinct Committee be formed, for the purpose of suggesting to the Society, the best means of carrying the proposed objects into effect.

The suggestion offered by Mr. Speede having met the concurrence of the Meeting generally, it was proposed by the President, and seconded by Mr. Storm, "that a Committee be appointed, to be called the Kitchen and Fruit Garden Committee."

It was further proposed by Sir John Grant, seconded by the Honorary Secretary, and resolved, that the following gentlemen be members of the Committee, with leave to add to their numbers, viz. Mr. Speede, Mr. Piddington, Mr. Storm and Dewan Ramcomul Sen.

Adjudication of Prizes for Cattle.

The next paper that was submitted was the following Report of Prizes awarded at the Cattle exhibition :—

Agreeable to previous arrangements, the exhibition of cattle for the year 1843, took place on the morning of the 1st of February, when the following awards were made.

Imported Neat Cattle

Nos. 1 and 2.—For the best, and second best *specially* imported bulls of the year 1842, there were no competitors.

No. 3.—For the best imported cow of any denomination, the *silver* medal was awarded to Dr. Huffnagle, for his *specially* imported Suffolk Pole cow, "Daisy,"—three years old, landed in August last.

Produce

No. 1.—For the best *cross*, the produce of an imported bull or cow with native stock,—the *gold* medal was awarded to Dr. Huffnagle for his spotted cow "Cowship," from English and Hurianah stock.

The animal is four years old, and in calf by an imported Suffolk Pole bull.

No. 2.—For the best *cross*, the produce of different varieties of the cattle indigenous to this country, there were no competitors.

No. 3.—For the best *bull* calf of any denomination, calved in 1842,—the *gold* medal was awarded to Dr. Huffnagle, for his jet black bull calf, "Lord Byron," dropped in Calcutta in October 1842, got by an English Pole bull out of an imported Suffolk Pole cow.

No. 4.—For the best *cow* calf of any denomination, calved in 1842,—the *silver* medal was awarded to Mr. J. Wallace for his thorough bred Alderney cow calf, calved in May 1842.

Imported Sheep

Under this head, there was no competition.

JUDGES.—Messrs. C. R. Pursep and John Hughes.

Remarks

The judges regret to state, that the show was not so good as that of last year, or of the year 1841. The cattle that received the prizes were every way deserving of them, but it would have been more satisfactory had the competition been greater.

There are one or two points connected with the conditions, particularly of the *fourth* clause, which appear to require some modification, in order to give every encouragement to parties desirous of exhibiting the cattle. An additional clause might also be introduced, prohibiting individuals sending a second time for competition, any cattle for which prizes have been previously awarded by the Society.

The judges beg to recommend these modifications and additions for the consideration of the Members of the Cattle Committee.

It was proposed by Mr. Staunton, and resolved, that the report of the judges be confirmed, and that the Cattle Committee be requested to take into consideration the alterations and modifications alluded to."

The Annual Report.

The President begged to call the attention of the Meeting to the Annual Report of the Society, for the past year—the same was referred to the Committee of Papers for publication in the Journal.

Carey Testimonial

The Secretary submitted a memorandum from the Finance Committee, relative to the Carey Testimonial Fund. The statement shews, that the total sum which has been subscribed amounts to 1,200 rupees. From this amount the sum of 16½ rupees for printing and other petty charges, and a further sum of 50 rupees, subscribed by three Members who died while the collection was going on,—in all Rs. 46.4.0 is to be deducted, leaving a balance of Rs. 1,153.12.0 to the credit of the Fund. Of this balance, the sum of Rs. 1,068.12.0 has been collected and deposited in the Bank of Bengal, and the difference, Rs. 85 is in the course of collection.

In connection with the above, the Secretary stated, that from a memorandum Mr. Piddington had kindly furnished, of the expense which had been incurred by the Asiatic Society, for a bust of Dr. Mill, amounting to a sum exceeding rupees 2,250, it would appear, that the sum available for the Carey Testimonial was not at present adequate to meet the cost which would be necessary to carry out the original intention of the Society. Mr. Hume added, that before coming to any determination on the subject, it would perhaps be advisable to seek the co-operation of the non-resident Members of the Society, from whom, with two exceptions, no Subscription had as yet been received.

The Meeting coincided in this suggestion, and the Secretary was accordingly requested to address the Motussil Members on the subject.

Report on samples of Ceylon-grown Cotton.

The Secretary presented a report which Mr. Willis had kindly furnished, on the samples of cotton grown at Ceylon, from American, Tinnevely, and Bourbon seed, which were presented by Mr. Robison at the December Meeting of the Society. The report, which was

a very favourable one, was transferred to the Committee of Papers for the Journal.

Approval by the Court of Directors of the measures adopted by the Society, for collecting information relative to an interchange of Plants, between Europe and Asia.

The Secretary stated, that it would doubtless be in the recollection of some of the Members present, the measures which had been adopted by the Society to give effect to the wishes of the Hon'ble the Court of Directors and the Supreme Government of India, as expressed in the despatch of the Court under date 13th February 1839, for collecting information on, and "suggesting such plants and trees as might be thought desirable for introduction into India, and those that can be furnished in return."

The Committee appointed by the Society, at the Meeting held on the 12th June 1839, when the despatch in question was submitted, commenced the duties assigned them without delay, and submitted the result of their labours at the July Meeting of the Society in 1840. The information thus collected from all parts of India was then arranged and printed in the course of the following year, at the expence of Government,—in an octavo volume, comprising upwards of 200 pages, entitled—"Suggestions received by the Agricultural and Horticultural Society of India, for extending the cultivation and introduction of useful and ornamental plants, with a view to the improvement of the Agricultural and Commercial resources of India."

In connection with this subject, he had now the pleasure to submit to the Meeting the following letter from the Government of India, communicating the gratifying intelligence of the approval by the Honorable the Court of Directors, of the measures which had been adopted by the Society on the occasion

A. H. BLECHYNDEN, Esq.

Deputy Secretary of the Agricultural and Horticultural Society.

General Department.

Letter from Sec. Agricultural and Horticultural Society, dated 11th July 1840.

Letter to do, dated 22d do. No. 563

SIR,—With reference to the correspondence noted in the margin, I am directed by the Honorable the President in Council, to transmit the annexed copy of Para. 28, of a letter from the Honorable the Court of Directors in the Public De-

partment, dated 21st September, No. 18 of 1842, communicating their approbation of the measures adopted for the spread of useful plants in India, and for the improvement of the roads in Shahabad.

(Signed) H. V. BAYLEY,
Depy Sec. to the Govt. of India.

Council Chamber, the 7th December, 1842

Extract Public Letter, No. 18 of 1842, from the Honorable the Court of Directors to the Government of India, dated the 21st September

Para. 34 and 40 Stating that, in consequence of the Court's instructions, the Agricultural and Horticultural Society had collected a variety of information on the vegetable productions of India, which was considered valuable, and ordered to be published at the expense of Government, an inquiry made into complaint received through the Society of the bad state of the roads in Shahabad and Goruckpore, which proved to be unfounded with regard to Goruckpore, measures taken to improve the roads of Shahabad.

Para. 28. These measures have our approbation, and we hope that the useful information which has been brought together and published will be diffused so that it may become generally known, and have the effect of inducing increased attention to the introduction and cultivation of useful plants suited to the different parts of India.

(A true Extract.)

(Signed.) H. V. BAYLEY,
Depy. Sec. to the Govt. of India.

Further experiments in reeling the Silk from the Cacoon of the Eri Worm.

The next paper submitted was a communication from Dr. Eveleigh, relative to the specimen of Eri silk, which has been already alluded to in the earlier part of the proceedings.—(*For this letter, see page 61 of Correspondence and Selections*)

Communications.

The following communications were likewise read :—

- 1.—From Baboo Dwarkanauth Tagore, tendering his best acknowledgments to the Society, for his election to the office of a Vice-President of the Institution.
- 2.—From Aaron H. Palmer, Esq. corresponding Member of the National Institution of Washington, enclosing a letter from the

Corresponding Secretary of that Institution, in which is conveyed a request to open a Correspondence with the Agricultural Society of India, and an intention of forwarding, by an early opportunity, the first and second Bulletins of the Proceedings of the Washington Association.

3.—From Dr. Esdaile, Secretary of the Branch Horticultural Society of Hooghly, requesting to be furnished with the usual assistance from the Parent Society, of two silver medals and fifty rupees, to be awarded at their vegetable show, which is to be held on the 27th January.

The Secretary intimated, that he had complied with the request of Dr. Esdaile.

4.—Extract of a letter from Dr. Wallich, dated Cape Town, Nov. 18, 1842, to the address of the late Dr. Spry, communicating a few items of information relative to the state of Horticulture at the Cape of Good Hope, and promising to afford every assistance to the Society that may be required.

5.—From Dr. Royle, intimating the despatch, by the *Hindoostan*, of a small quantity of seeds of cereal grains, hemp and flax, and promising to send a further quantity of fruit tree grafts in due season.

The Secretary mentioned, that the grain and other seeds had been duly received, and were now in course of distribution.

6.—From Brigadier Stacy, enclosing a statement of the range of the thermometer, &c. kept at Khat-i-Ghulzie and Candahar.

7.—From H. V. Bayley, Esq., Deputy Secretary to the Government of Bengal, applying, on behalf of the "Colonial Secretary at Colombo," for a quantity of acclimated Sea Island cotton seed, for distribution in the Province of Jaffna.

The Secretary informed the Meeting, that this request had been duly complied with.

A long and interesting letter from Colonel Sykes, to the address of the late Secretary, was likewise submitted, and referred to the Committee of Papers.

For all the foregoing communications and presentations, the thanks of the Society were accorded.

Observed at 9 H. 50 M.				Observed at 4 P. M.				Observations made at 8 P. M.				Observations made at 10 P. M.			
Temperature.		Wind.		Temperature.		Wind.		Temperature.		Wind.		Temperature.		Wind.	
Barometer.	Of the Mer.	Of the Air.	Of the Surface.	Direction.	Barometer.	Of the Mer.	Of the Air.	Of the Surface.	Aspect of the Sky.	Barometer.	Of the Mer.	Of the Air.	Of the Surface.	Direction.	Barometer.
Inches.	°	°	°		Inches.	°	°	°		Inches.	°	°	°		Inches.
29.808	69.5	73.5	68.0	N.	29.808	72.0	81.4	72.6	Cumuli	30.100	72.0	71.7	70.0		30.025
825	70.0	73.0	68.5	N.	825	72.8	81.4	73.5	Cumuli	30.060	73.0	72.75	72.25		30.050
853	70.5	76.0	70.0	N. W.	853	73.0	84.0	73.0	Cumuli	30.000	73.0	72.75	72.5		30.000
849	71.0	75.0	71.0	W. S. W.	849	74.4	82.3	73.0	Generally Clear.	30.008	73.0	72.0	72.0		30.000
863	71.0	75.0	68.5	N. W.	863	74.4	82.3	73.0	Generally Clear.	30.025	73.0	73.25	73.0		30.025
870	71.0	74.0	71.0	N.	870	75.0	84.0	74.2	Cumuli	30.000	71.0	73.75	73.5		30.000
874	71.0	74.0	71.0	N.	874	75.0	84.0	74.2	Cumuli	29.830	76.0	73.75	73.0		29.850
874	73.0	78.0	74.0	S.	874	78.1	86.0	79.2	Cumuli	30.000	74.0	73.75	73.25		30.000
874	73.5	78.5	75.0	W. S. W.	874	77.4	87.5	79.0	Clear	30.000	77.5	77.25	77.25		30.000
874	74.1	79.0	73.4	W.	874	77.5	89.2	79.4	Clear.	30.000	77.0	77.5	77.0		30.000
841	74.0	80.4	72.0	N.	841	77.5	90.0	80.4	Clear.	30.000	77.0	77.5	77.0		30.000
869	75.0	80.0	73.5	N. W.	869	75.5	80.0	73.5	Curro Cumuli.	30.000	75.0	75.5	75.0		30.000
877	73.9	74.0	70.2	N. W.	877	75.0	86.0	77.0	Clear.	30.000	75.0	75.5	75.0		30.000
874	74.0	79.2	72.8	S. S. W.	874	75.6	88.8	79.0	Clear.	30.000	76.0	76.5	76.0		30.000
874	74.0	79.5	71.0	E.	874	76.4	88.6	79.0	Clear.	30.000	76.0	76.5	76.0		30.000
874	75.0	77.0	74.0	E.	874	78.5	87.0	78.2	Cumuli	30.000	77.5	77.25	77.0		30.000
889	76.0	78.4	74.0	W.	889	78.5	80.7	73.5	Curro Cumuli.	29.975	77.5	77.25	76.5		29.974
853	74.0	75.0	71.0	S.	853	78.6	82.3	76.1	Cloudy (Curro Cu- muli.)	30.000	77.5	77.25	76.5		30.000
853	74.7	78.2	72.4	N.	853	79.4	86.2	79.0	Clear.	30.000	76.5	76.5	76.0		30.000
906	75.2	79.4	74.1	N. E.	906	79.2	87.0	83.0	Cumuli.	30.000	76.5	76.5	76.0		30.000
953	76.0	79.0	76.0	N. E.	953	78.5	85.7	76.0	Clear.	30.000	76.5	76.5	76.0		30.000
941	76.1	81.3	72.3	N.	941	78.5	87.0	76.9	Generally Clear.	30.000	76.5	76.5	76.0		30.000
905	74.0	80.6	73.0	N. E.	905	79.5	86.0	82.1	Clear.	30.000	76.5	76.5	76.0		30.000
930	76.0	79.0	72.7	W. S. W.	930	79.4	87.0	77.0	Cumuli.	30.000	76.5	76.5	76.0		30.000
925	77.5	80.5	74.0	S. W.	925	81.7	87.0	77.0	Very Cloudy	30.000	76.5	76.5	76.0		30.000
896	77.5	81.0	76.0	S. W.	896	78.4	79.0	75.0	Very Cloudy	30.000	76.5	76.5	76.0		30.000
874	77.2	82.0	77.0	W.	874	79.8	88.0	78.7	Cumuli.	30.000	78.5	78.5	78.0		30.000
874	77.2	82.0	77.0	W.	874	81.5	88.7	77.9	Curro Cumuli	29.950	72.0	78.5	78.5		29.950

Correspondence and Selections.

FORMATION OF AN AGRI-HORTICULTURAL SOCIETY AT BHAIKLEPORE.

*Communicated in the following letter from Major T. E. A. NAPLETON,
Secretary of the Society, dated the 14th April, 1843*

I have the pleasure to forward to you the Proceedings of a Meeting convened at this station on the 11th instant, which I request you will kindly lay before the Honorable the President and Members of the Parent Society at the next General Meeting, with a solicitation that our Agricultural and Horticultural Society just established here may become a Branch Society.

The donation of seeds you were kind enough to send me arrived in very good order, and the vegetable marrow, citron melon, cucumbers and crooked squash, were sown immediately, and the plants are now blossoming. Your request for a further supply of Cabool Clover and Lucerne seed shall meet with every attention, indeed several beds have been marked off for seed, and when it ripens shall be collected and forwarded to you for presentation to the Parent Society.

The spot of ground selected for our Public Garden here, is a most desirable one, and the situation beautiful, and there is great promise of every success attending our, at present, but infant institution. The great zeal, indeed enthusiasm displayed by all parties, I have never seen surpassed, and it is believed that the district generally will be considerably benefited, by the importation by the Society of fresh and new kinds of seeds, such as potatoes, carrots, turnips, cotton, and the like. Bailey in particular has so much deteriorated in this zillah for want of a change of seed, that this year's produce is exceedingly bad, and the grain not much larger than that of oats. If therefore we could obtain a small supply of this useful grain for distribution to the ryots in time for the October sowing, it would be quite a boon to the cultivators of it, perhaps the Parent Society will kindly forward our views in this matter.*

* Steps have been taken to meet this request.

EXTRACT FROM THE PROCEEDINGS.

At a Meeting of the Residents of Bhaugulpore and its vicinity, convened at Cleveland House on the 11th day of April, 1843,

E. V. IRWIN, Esq., in the chair,

The following propositions were put and carried *nem con.*

1st.—That an Agricultural and Horticultural Society be established forthwith.

2ndly.—That the objects of the Society be to encourage the Gardeners of the place and neighbourhood to cultivate superior kinds of vegetables, fruits, and flowers to those now grown, to effect which, seeds from England, France, Italy, the Cape, and America be procured and distributed.

3rdly.—That each Member give a monthly subscription of one rupee and eight annas

4thly.—That the funds be expended in the purchase of seeds, in giving money prizes to the gardeners and ryots, who bring to the show rooms the best specimens of fruits, vegetables, flowers, grain, cotton, tobacco, sugar cane and the like, such specimens being the bona fide produce of their gardens or estates.

5thly.—That the prizes vary from one to five rupees each.

6thly.—That the first show of fruits, flowers, vegetable and agricultural produce, take place on the 10th of May proximo.

That the second show take place on the 1st of Nov. 1843.

That the third show come off on the 21th of Dec. 1843.

That the fourth show take place on the 21th of Jan. 1844.

That the fifth show come off on the 24th of Feb. 1844.

7thly.—That these resolutions be circulated for the information of all European and Native gentlemen, zameendars and ryots, living within 10 miles of this place, and that non-resident subscribers be entitled to seeds and all advantages of the society.

8thly.—That the judges or umpires to decide on the best Agricultural produce consist of three gentlemen, and that two ladies and three gentlemen be solicited to decide on the best specimens of fruits and flowers.

9thly.—That the Secretary be appointed to keep the accounts, collect subscriptions, and carry on all correspondence connected with the society, and that intimation be given to the Parent Society in Calcutta expressive of our wish to become a Branch Society.

Major Napleton was duly elected Secretary.

PRELIMINARY REPORT ON THE HORTICULTURAL GARDEN AT LUCKNOW.

*Communicated in the following letter from Capt G E HOLLINGS,
Secretary of the Branch Horticultural Society of Lucknow, dated
11th April, 1843.*

I am much obliged for your kind and polite letter of the 29th March, which reached me a few days ago.

I will prepare with as little delay as possible, an account of the present state of the Horticultural Garden at Lucknow. I will do all in my power to ensure the successful propagation of any seed you may be able to send me.

I am unfortunately but little acquainted with the Science of Horticulture, and therefore unable to give you the technical names of the fruit trees in the garden under my charge. It may probably be sufficient for your purpose, if I mention generally, what fruit trees are at present thriving there.

1. A very large variety of orange citron, and lemon trees
2. Bombay and other scarce graft mangoe trees. In the Nursery there are several seedlings of the finest kinds.
3. English and China peach tree.
4. Nectarines.
5. Apples and pears. Of the former, there is some variety, the latter blossomed for the first time this year, but no fruit has set.
6. Alloo Bokharas loaded with fruit.
7. Different kinds of guava : one called by the gardeners "Walatee Umroot," at present in full blossom, apparently a scarce kind, from the smallness of the leaf and dwarfish size.
8. Vines bearing black and white grapes. There are some of both colours called by the natives "Ban-danuh," or without seeds, and the long black grape, usually called Hubshee.
9. Pomegranates of several kinds.
10. Custard apples.
11. Plantains of various kinds.
12. A small plum, called by the natives "Aloochnu;" the blossom was abundant, but the fruit has not set.

13. Pine apples. I got 250 plants from Goruckpore this year, almost all have taken, and some few are showing signs of fruiting.

14. Strawberries, in the second crop which is still in its prime I have had as large and well tasted fruit as I have seen in India.

15. Loquats, the trees were very productive, and have just gone out of fruit.

16. Whampee; a small number of trees loaded with fruit.

17. A large number of dates, with apparently little variety.

The indigenous fruit trees are mangoe, tamarind, kumruk, and several others, of which I do not know the name.

Of forest trees, we have the teak, toon, sissoo, and babool. There are two healthy caoutchouc trees. There is a great variety of trees esteemed by the natives for their medicinal qualities; but I am unable to class them, or give their names. The senna shrub thrives admirably.

There are several trees of which I can get no further information than that they came from the hills, the countries to the north and west of our dominions, or Calcutta. They are, however, healthy, and I hope in time to learn from those better acquainted with the science of Horticulture than I am, what they are.

Mr. Buller, the Magistrate of Shahjehanpore, kindly sent me some willow and ether slips, all of which are thriving. We have several creepers which originally came from the "*hills*," in great perfection, and I have a very beautiful one, a native of Arracan, which was given to me by a friend, its leaves are always green, and it blossoms every month.

It would be almost an endless labour to detail the varieties of flowers and shrubs, but I cannot resist mentioning, that I have been particularly successful in shipping geraniums and carnations, and in propagating the violet. I hope by next season to have a large assortment of seeds from England.

With regard to articles associated with commerce, I regret to say, that the efforts made by my predecessors have not been so successful as might have been wished. A very fine description of sugar cane has been spread over the country, but owing to the depredations of white ants and other causes, our stock is nearly exhausted. A small portion of that which was planted this year, has come up.

There are some shrub of what is said to be Egyptian cotton, but I cannot find out when they were planted. I had them cut to about three feet, and there appears to be every chance of the experiment succeeding.

There is a large plantation of arrow root, which seems to thrive very well. If it were desirable I could send you a specimen of some that was manufactured here during the present year.

"Guinea" grass and lucerne have succeeded uncommonly well. A very fine field of oats has just been cut, and the *rubbee* harvest, contrary to expectation, has turned out a tolerably good one.

It may be interesting to know, that I have succeeded in raising some vine plants from seeds taken from the Cabool grapes sold in boxes, and that some grape seeds which Sir Wm. Nott, G. C. B. brought from Candahar and Cabool have germinated. I have also succeeded in getting some plants of an orchid said to be that which yields the "*Salop Misree*" of commerce, they have taken root, and seem to be thriving. There is very fine hemp growing in a garden belonging to the Residency, I would have some prepared as a sample, if I knew the course of manipulation it requires.

The seeds which I should like to get first, are Indian corn and cotton. The garden is very extensive, 747 yards long and 735 yards broad, and therefore I could find room for the cultivation of any thing, with a view to distributing seeds or cuttings in the Upper Provinces. I should like very much to get a good supply of leeches, and any space trees that may have reached Calcutta in good order. There is great variety of soil, and facilities for obtaining sun or shade *ad libitum*. White ants are very troublesome, but I have succeeded in keeping them off the pine apples, vines, and peach trees, by mixing lime with a decoction of madar leaves. I have not tried solution of assafoetida, but have heard that it is generally efficient for driving white ants away. There are several Officers here who take a great interest in Horticulture, and who have kindly given me the benefit of their experience. I am indebted to them for several valuable hints, and feel confident that with their friendly assistance, I shall be able to keep our garden in tolerable good order.

* A specimen has since been received, and a report on it will be furnished in due course.

[A large assortment of seeds has been forwarded to Lucknow.]

PROGRESS OF COTTON CULTIVATION IN THE GOVERNMENT EXPERIMENTAL FARMS AT COIMBATORE.

Extract of a letter from Dr. ROBERT WIGHT, Superintendent Government Cotton Farms at Coimbatore, dated 12th May, 1843.

“ A very long time has elapsed since I received a letter from you regarding some Tennessee Cotton seed, which the Society had with much consideration for our then pressing wants, directed to be supplied, but which donation, had been rendered unavailable through impediments, about that time, thrown in the way of the free transmission of packets by Government. That letter reached me when greatly indisposed. I however commenced a reply, but being unable to finish my letter, laid it aside, intending to resume it next day. The half-finished letter lies before me, but being long out of date I do not intend completing it, nor alluding further to the subject than merely remarking, that there are still several packets of the seed then sent, unsown, owing to their having arrived much too late. I now write, even at this late date, to acknowledge my obligations to the Society for its kind attention in thinking of such distant friends, and to add, for the information of members interested in cotton cultivation that I now have it in my power to repay the favour with abundant interest, being enabled to state that I can place at your disposal probably 2000, or more, pounds of New Orleans seed, all of excellent quality, and acclimated by two years culture in Coimbatore.

Having accomplished my object in addressing you, I shall now advert to another matter. The Court of Directors recently sent us a most bountiful supply of cotton seed from America, among which it was stated there were 250 bushels of Sea Island seed. On the strength of this assurance I had promised supplies to some friends, wishing to try it on the Tinnevely coast, in situations which I think promise well for ample success. But on opening the casks we find that not a single pound of Sea-Island has been received, and now I have but two seers, part of that sent by you last year, available for the purpose. If the Society has any to spare I shall esteem it a great favour if I could be furnished with a few more seers for their use.

Our cotton crops this season have upon the whole turned out satisfactorily, though they have fallen far short of our anticipations a month ago, owing to recent very unseasonable weather, accompanied with much rain. Some of our fields promised to yield as much as 1,000lbs the acre, but were quite destroyed just as the pickings began. A farm from which at least 50,000lbs was expected did not give above 30,000. Another from which I anticipated from 25 to 30,000 has as yet only given 16,000, but both promise good second crops, which may in the end compensate for past loss. Our crops may amount to about 200,000lbs* of seed cotton, we expected at least one-third more."

REPORT ON SAMPLES OF WOOL FROM A CROSS-BRED AND FROM A
KOHISTAN EWE *

*Communicated in the following letters from Mr. ROBERT SMITH,
of the Commissariat Department, to the Secretary.*

Calcutta, 14th March, 1843.

I have examined the sample of wool, (a first cross between a Merino Ram and Patna Ewe,) which you sent to me, and after carefully comparing it with numerous musters of commercial wools which I have by me, my opinion is as follows :—

The wool is not so good as a sample of cross Merino bred in this country which is in my possession, and which is worth 1s. 3d. per lb in the London market. The present sample is somewhat coarser in the fibre, but it has the advantage of a longer staple, its color is also not so pure as it might be, and the fibre has a shade of weakness in it. None of these disadvantages, however, are sufficient to disqualify the sample taken *per se*. Wool of this kind, in large quantities, would find a market in England at about 1s. to 13d. per lb., and a little more breeding would bring it up to a much higher standard. Now that the Indus is open, fine woolled ewes from Mekram and Jhawar in Beloochistan might be readily procured, instead of breeding

* These samples were presented at the general meetings of the Society on the 8th March and 17th April, the first by Mr. C. J. Muller, Deputy Collector at Patna, the other by Major Napleton, at Bangalore.

from the coarse wooled sheep of Patna, and with the Jeypoor sheep, to give sire, a cross-breed might in a few years be established on this side of India, which would lay the foundation of much wealth to growers, and benefit the country and the revenue materially.

While on this subject, could not the Society address the Government with reference particularly to Captain Postans' researches, (page 434 of the Monthly Journal of Agricultural Society for December 1842,) to procure samples of wool from all parts of India, particularly from the N. W., that those who are desirous of entering into the trade in wool, might know the best sources of supply ?*

28th March, 1843.

I have the pleasure of replying to your note regarding the muster of Kohistan fleece-wool, which you sent to me some few days since.

From the matted structure of this fleece, it would not prove a marketable commodity in its unimproved state, since it could not be *combed*; but from its softness, length of staple, and fine fibre, the ewes of this breed, if of a tolerable large body, would be well adapted for laying the foundation of a valuable mixed stock, when crossed by Merino rams, themselves of good blood. It is a great error, that the few attempts which have been made in this respect in India, have been injudicious, in taking the dam from the hairy sheep of Bengal, and the sire from the Merino: this is like breeding from the race-horse and the tattoo. The sire, under any circumstances, should be Merino of the best blood, and the dam, the produce of Merino and best soft wooled country sheep which can be obtained, that is, wool from the *second* generation. There can be no doubt that these Kohistan ewes crossed by the Merino would at once yield a wool worth 1s. 3d per lb; but not having seen them, and consequently not knowing their size of carcass, I am unable to say if they would be profitable. If they would yield 4 lb of wool annually, they ought to be.

In my opinion, there is nothing to prevent the growth of good marketable wool in India, provided it be gone about in a proper

* The Cattle Committee have been requested to take this suggestion into consideration, and embody their opinion thereon in their next Report, which will shortly be submitted to the Society.

manner. We have all kinds of climates, and the short sun-burnt grass of this country is precisely that on which the best wool is produced. Bhanguelpoor, Mussoorie, the Dhoon, in fact, all hilly districts, with short scanty herbage, little jungle, and wide, sandy plains, with clumps of trees here and there, would suit the sheep breeder, only he must commence with the proper breed, if he expect to succeed.

REPORT ON SAMPLES (1 AND 2) OF TEA GROWN AND MANUFACTURED
IN ARA.

*Communicated in the following letters from J. RENNIE, Esq. firm of
LYALL, MATHESON AND CO.*

March 10, 1843.

I have had the Tea (Mr. Agabeg's sample) tasted by a party who is a pretty good judge, and we are of opinion that the muster has the appearance of small grained Congou, with a slight admixture of Pekoe; the flavour is much the same but is strong and rather coarse, and at the same time it seems fresh; in fact, the taste and smell partly resemble rough Green Tea, to which I should think the specimen more closely allied than to Black Tea, was it not for the colour. Such quality is never exported or met with in the Canton markets, and the presumption therefore is, that it is not the produce of any province in China, from whence we derive our supplies.

March 25, 1843.

I have had Captain Speirs' sample of tea tasted by an experienced judge of the article, who is of opinion, that notwithstanding the colour, the appearance of the leaf and flavour are those of Green Tea, and he classes it as nearest approaching to fair Twankay, worth by last accounts about 1s. 4d. per pound. He suspects, moreover, that the muster is mixed, containing other leaves besides tea. Upon the whole, this is inferior in flavour to the former musters.

* Sample No. 1, was presented by Mr. Joseph Agabeg, at a general meeting on the 8th March; sample No. 2, by Capt. W. Speirs, at meeting on the 17th April.

Report of the successful introduction of Carolina Paddy into the Malwan Zillah, (Bombay Presidency.) From ALEXANDER ELPHINSTON, Esq., to the Secretary of the Agricultural and Horticultural Society, Bombay

Malwan 27th February, 1842

I have the pleasure to transmit, agreeably to your request, a few remarks by the native authorities of this collectorate, on the successful introduction (through the kindness of Mr. Giberne) of the Carolina Rice into this Zilla, which may prove acceptable to the Society.

In 1839-40, Mr. Giberne sent me a small parcel of this seed by post, which I distributed to the different mamlutdars of this collectorate, with instructions that it was to be given for trial to the best cultivators, and there now remains of the produce of that seed at the end of three years 7 maunds and 9 seers in hand. I do not adduce this as a large return, being convinced that at first the seed did not meet with proper attention, as in one district where the seed was sent it was never sown at all, and in an other only in the second year after it came into possession, and was probably treated with this neglect from prejudice, or in consequence of the disappointment attending previous unsuccessful attempts with other foreign seeds. The natives, who have cultivated it, now acknowledge its superiority in every respect to the country rice, in spite of their previous prejudices against it. It only requires to be better known and extended, when I conceive its introduction will prove a source of great public benefit to the country.

Experiment of the Carolina Rice, forwarded by GEORGE GIBERNE, Esq., in November, 1839.

In 1839-40.				In 1840-42.				Remarks regarding the Carolina Rice, forwarded by the district Officers.
Cultivated during the Rain.		Cult. Water during Hot Season by Irrigation.		Cultivated during the Rain.		Cultivated during Hot Season by Irrigation.		
Quantity of Quantity produced, Seed.		Quantity of Quantity produced, Seed.		Quantity of Quantity produced, Seed.		Quantity of Quantity produced, Seed.		
Mds. Seers.	Mds. Seers.	Mds. Seers.	Mds. Seers.	Mds. Seers.	Mds. Seers.	Mds. Seers.	Mds. Seers.	
2	23	24	28	24	24	24	24	The Muzahdar writes, the year of this district say that here the crop yielded by this rice certainly exceeds by one fifth that of the country rice.
16	1	10	10	10	10	10	10	The Muzahdar reports, that the stalk of this rice is strong, the ears good, and the crop good and in all these respects it is superior to the country rice. It takes a medium time to be being the late or early.
1	1	1	1	1	1	1	1	The above information is derived from Radio Muzahdar, who has cultivated the largest quantity in this district of the foregoing, and I concur in the above opinion, as I have seen the crop, and I consider that, with proper attention, this rice will yield a larger crop.
2	2	2	2	2	2	2	2	The quantity of this rice that has been cultivated here is so small that I am unable from it to determine accurately whether it yields a greater quantity of crop than the country rice, but from what I have seen of it this year, I am inclined to suppose

*Report on samples of Hemp, grown and prepared in Zillah Malwan.
Communicated by ALEXANDER ELPHINSTON, Esq., to the Secretary
to the Agricultural and Horticultural Society, of Bombay.*

Malwan, 27th February, 1842

I had the pleasure to receive your note regarding Indian Hemp, Cotton, &c., and herewith submit to the Society, for determination of their value, numerous small samples of hemp, (as per accompanying list) (1) obtained from Ryots in different parts of this collectorate prepared by them according to instructions for its improvement, circulated by Government through the Revenue Commissioner, and emanating from a gentleman in England, of which I send you an extract. (2), as it describes the faults in the preparation of our Indian hemp from allowing it to stand too long before it is pulled up, and being too long steeped, and suggesting that it should be taken up as green as possible after attaining its growth.* It appears, however, to those here who have examined the samples herewith transmitted, that those which most resemble in greenness the Baltic and European specimens sent to me, are the worst and weakest of the lot, and that the other samples prepared with the least deviation from the usual process of the natives is the best; and if the Society think so, they will perhaps be kind enough to favour me with more detailed information as to the proper mode of preparing this article for the European market.

2. You were pleased to inquire the quantity of hemp which, in my opinion, ought to be produced by the competitors for the prize, to entitle the person presenting the best specimen to a reward. About one Bombay candy of weight is the average quantity generally raised by one cultivator, and I think it would be safest for the attainment of the object in view (of causing a superior article to be raised) to fix upon a quantity not exceeding that which I have named, as being within the compass of nearly every cultivator's ability to produce,

* These remarks are likewise applicable to some samples of Hemp and Flax, grown and prepared at Chittagong. The samples have been forwarded to the Agricultural Society of India, by Mr. Sconce, the Collector of Chittagong, and are now in circulation to the Hemp and Flax Committee, whose report will appear in an early number of the Journal — *Ed. Journal Agricultural Society of India*

and thereby extending the circle of competition to its utmost verge. This seems to be the principle adopted in England, where a single animal or a single fruit is allowed to gain the prize.

3. I believe that all the natives follow but one and the same method in preparing hemp, and that the slight differences in the quantity of the article is chiefly attributable to the soil in some fields being better adapted for its cultivation than at other places, and unless it be determined to confine the distribution of premiums to those who evince superior skill and enterprise as displayed in the production of hemp specimens *much better than the best country hemp* now brought to market, I do not think it would be of any service towards bringing about a general improvement in the preparation of this article for the market. At the same time, if the prize is only to be gained on such terms, I fear it would almost be tantamount to excluding the natives from the competition for it, as it appears to me that the native cultivators are too ignorant and poor, living, as they do, from hand to mouth, to purchase foreign seed, and try experiments in new modes of culture, and preparation of hemp, but the exaction of a prize article, superior to that now produced in this country, would save the funds from being needlessly wasted.

4. I may instance, as an illustration of this argument, that I believe no improvement was effected in the manufacture of Indigo in Bengal, until the skill and intelligence of Europeans was applied to the subject. And to obtain similar improvements here, the natives would require teachers, or instructive pamphlets in their own language on the subject. Pamphlets of this nature, circulated by the orders of the late Revenue Commissioner, taught some natives to make sugar for the first time, who were quite surprised at their own success. I would therefore suggest, for the consideration of the Society, whether it would not be more useful to apply, for a few years, the fund available for a reward in conducting an experiment under the Society's superintendence with the best seed, and means of application at their command; and, after obtaining success, publishing the information gained for the benefit of the uninformed? The Society would probably be able to make arrangements to secure the services of a competent hemp-grower from Manilla, or skilful peasant from Flanders, and if the latter, an allotment of ground might be procured for him

at Mahabuleshwur, with some natives or Chinamen under him to act as labourers; and acquire, and afterwards disperse throughout the country, a knowledge of the art which they would gain under his teaching. It appears to me that a plan of this nature affords the surest prospect of success in bringing about a reform which shall introduce a superior article to the Indian market

Extract of a Letter from a Gentleman in England, with his opinion of the Hemp Samples sent from Bombay by Dr. GIBSON

The Samples of Hemp are not so flattering (as that of the Sugar) but I do not despair of seeing the produce of the Baltic supplanted by that of India; as the defect appears to me *solely to arise in the management of it*. It stands too long before it is pulled or cut, or is too much steeped or exposed to get the fibre to separate from the stalk. This is, indeed, a very important part of the operation, as it not only injures the staple and colour, but makes it harsh and difficult to manufacture, and, of course, bad to sell here. Hemp, after getting its growth, should be taken as green as possible. I send a sample of clean Baltic Hemp, the colour and quality I beg to call your attention to. This meets a ready sale at £40 per ton, and the greater part of that by the "*Wanderer*," which is of similar quality to your Umbarree or Wibisenseumralims, cannot be sold at £16 per ton in the same (Hull) market. You will perceive how much depends on *colour and staple*. Prejudice is not wanting, but that is giving away.

The sample, No. 2, Cortolaria Jemca or Tag, appears to me to be of the same quality as the Baltic. I return a part of it, made ready for spinning. You will see the great similarity of the two. My twine-spinner assures me that by taking it sooner, and by using more care in the steeping and exposure, it will *be fully equal to the Baltic*; surely by attention this may be accomplished. It may require Englishmen to direct, and our implements (which are truly simple) to be used, when I have no doubt of the successful result, both to the grower, the merchant, and our country.

I also send samples of Flax No. 1, of our own growth, after bearing seed. No. 2 is Flemish, and pulled when the seed is just beginning to form. Here, as in Hemp, colour is paid for, the

Flemish selling from £46 to £50, the English £38 to £42 per ton; but, generally, if the Flax yielding seed also is well managed; there is not so great a difference, and the seed is always in demand here at good prices.

Your hemp is very clean—a material point, but it wants more beating and dressing, and I think the natives have not proper implements to do it with. I have heard they separate the fibre from the stem by the finger, without steeping it. If so, unless exposed to the sun afterwards, it must stand too long before taken, to get so much *bleached, harsh and tender*. If it be so separated, I would suggest simply beating it soft, keeping it long and straight as possible, and cutting off the discoloured parts near the roots.

You cannot improve in your mode of packing, it is *decidedly superior* to the Baltic. I hope to have a sample at least of your Indian grown flax on your return.—*From the first number of the Transactions of the Agri-Horticultural Society of Western India, April, 1843.*

On Manuring with Green Crops. (By PROFESSOR CHARLES SRENGEL, translated from the German.)

Green manuring is the operation of growing certain plants merely for the purpose of ploughing them in as soon as they have reached a certain maturity (viz., are in blossom), which may be done either on the spot, or by conveying them to another field. Green manuring is no modern discovery, for it was used even by the Romans, especially with the Lupine. Although this sort of manuring has been extolled by some authors beyond all measure, it cannot be doubted that it is a very advantageous operation, especially on light land, with a pervious subsoil. Its advantages are most of the plants grown for green manure obtain from the subsoil, by means of their deep roots, those substances which are required as food by shallow-rooted plants, and which are thus brought back to the surface, whence they were previously removed by rain; at the same time they convey substances to the surface which it never before possessed. These are the chief advantages derived from ploughing in green crops, which, however, have not been hitherto properly appreciated. Amongst the more useful substances thus brought up from the subsoil, are potash, soda, chloride, sulphuric and phosphoric acid, magnesia, a lime. The green crop, when ploughed in, enriches the land with carbon, and espe-

cially with nitrogen, both which substances are absorbed from the atmosphere by the leaves. That it supplies soil with nitrogen is very important to Corn-plants, for they possess the power of attracting nitrogen (one of their chief sources of nutrition) from the air only in a very slight degree. Green crops, moreover, when ploughed in, keep hot dry soils cool and moist; because the humus which is engendered by their decomposition not only absorbs much moisture, but also retains it for a long time. Then, again, their strong herbage and woody roots act mechanically on heavy land by loosening it. After manuring with a green crop, corn is never laid, although it grows as luxuriantly as after a dressing of dung. The reason of this is, that dung supplies the ground suddenly with a great amount of nitrogen, which green manure affords much more gradually, in consequence of the slowness of its decomposition, acting most powerfully when corn requires most nourishment, hence a heavier crop of grain after green manuring than after a dressing with common dung. Green manure, however, will not last more than two years, the reason of which is, obviously, that the mass of herbage ploughed in is often not more than a third of the weight of dung. Green manure is very economical, not requiring more than one ploughing and harrowing, and the seed is generally very cheap. When fields are at a great distance, it saves much carriage; and, finally, it protects the soil from losing its humus by evaporation, because as soon as the corn is gathered in, the field is ploughed, and the crop for green manure is sown. No doubt these advantages are very important: they have even led to the assertion that plentiful crops may be obtained without any other kind of manure—if, only, between every two corn-crops green manure is employed. It has been, however, forgotten that green manure itself will exhaust the subsoil in the long-run; and then, not even green manure can be had any longer. However, the subsoil be very rich in fertilising substances, the surface-soil may be kept by green manure for many years in full vigour, without the assistance of dung; nevertheless, under any circumstances, it will be useful to manure occasionally even for green manure—employing such substances as gypsum, common salt, bone-dust, wood-ashes, &c., which will be useful to both the crop for manure, and to the corn that is to follow.

But however useful green manure may be, it has many opponents. It is said that it must be better to feed the cattle with such plants than to plough them in, and to return to the field the manure thus obtained. 'because this will not only feed the cattle, but also animalise the manure. We must, however, consider that the advantage derived from

feeding with such plants as are used for green manure is not so considerable as to repay the expense of mowing and cartage, the loss of manuring substances during the preparation of the manure, the carrying it back, and spreading it again upon the fields. But of plants ploughed in green, nothing whatever is lost, as they perform the whole processes of fermentation, putrefaction, and decomposition in the ground. Moreover, fodder does not improve in strength, but loses some of its power in passing through the body of animals, to which is to be added, that to light soils green manure is more useful than dung, and that, in fine, many plants which in the state of green manure are very beneficial, are not relished at all by cattle.

He who wishes to obtain all possible advantages from green manure must observe — 1. Those plants only must be sown whose seed is very cheap, otherwise green manure will be expensive as compared with dung.

2. Plants must be taken which are sure to succeed and grow very fast, in order that in the shortest time the largest mass of herbage may be secured.

3. They must not contain substances that may be injurious to the succeeding crops, otherwise much time will be lost by waiting till they are decomposed, or have passed into a state of putrefaction.

4. Deep-rooted plants must be sown, for such will absorb the nourishing substances hidden in the earth, and convey them to the surface for the use of the shallow-rooted crops of corn. We are not, however, required to confine ourselves to annual plants, on the contrary, it is much better (as will be seen hereafter), if perennial plants are sown, because in that case annual cultivation and all the seed after the first will be saved. Such plants cannot, as a matter of course, be ploughed in on the spot, but they must be cut down, and carted on the field most in need of manure. For this purpose, plants may be used that have not yet been much thought of, of which I shall speak hereafter.

5. Those plants, more especially, are to be used for green manure which have many broad leaves, because they most absorb aeriform substances (carbonic acid, hydrogen, and nitrogen) spurry is an exception to this rule.

6. Those plants must be selected which absorb from the subsoil those mineral substances in which the surface is deficient, and which are required for the nourishment of the future crop of corn; but whether those substances on which the success of deep-rooted plants depends are to be found in the subsoil can only be decided by chemical analysis.

7. In order that the plants sown may yield the greatest amount of herbage, seed must be used abundantly. It may therefore be useful to sow different sorts together, so that if one does not succeed, the other may. In all cases where plants are sown for green manure, it is essential that the field should be clear of grass and other weeds, because as the land cannot be ploughed more than once, weeds may increase subsequently to such an extent, that the failure of the corn crop may be apprehended. Deep-rooted weeds are best destroyed by the closeness and shade of the green crop, and this is an additional reason for sowing a great deal of seed.

8. The land which is to be green-manured must itself be rich enough on its surface to sustain the green manure on its first development. All endeavours by ploughing in green plants to fertilise a soil which is deficient in all vegetable nourishment, will be always vain, but if land is very poor, such plants must be selected which, like spurry, need very little nourishment. They are to be ploughed-in and resown repeatedly, till the land is capable of bearing something better, which will also yield an abundant herbage. This, of course, takes up several seasons. In most cases, however, nature is the best nurse, and a field which is too poor to repay the outlay of cultivation, if left fallow, or used for feeding, will by degrees produce a scanty vegetation, or grasses or clover may be sown, and then if the field has been fed off for three, four or five years, and is again ploughed, the soil will have received some nourishment from the roots of grass, and will probably carry a tolerable crop. The proper green crop will, however, be always preferable, if a soil is to receive strength from itself, because plants which are constantly eaten down to their very roots can receive but little nourishment from the air.

9. All plants used for green manure must be ploughed in at the moment they are in full blossom, not sooner, because then the herbage will not have attained its utmost extent and weight, not later, because the humus from the decaying leaves will needlessly evaporate; more especially, however, because the flowers exhale nitrogen, which must be preserved, by all possible means, for the subsequent crops. It is generally said that a crop must be ploughed-in before it has run to seed, or otherwise the strength of the soil will be diminished. This, however, does not seem to me to be correct, because whatever the soil has yielded to the seeds is returned to it in the same way.

10. If green manuring is to produce the best possible effects, it is necessary (at least in the north of Germany) that the winter crops, which are grown afterwards, should not be sown too late. Green-manure, on

account of the little nitrogen it contains, and because of its decaying only in warm weather, cannot push crops on; so that if the farmer sow too late, his crops will not only be weak during the winter, but will also grow very slowly during the spring, more especially in damp land, containing much coal of humus. Corn should therefore be sown, at the latest, by the end of September. I say this from my own experience, and warn every one not to neglect the advice.

Having now treated thus generally of green manure, I shall proceed to notice the plants which are ploughed in green. Their value is very different, depending (as in all manures) upon their chemical ingredients. I therefore consider it necessary to state, not only the amount of manure which each plant yields to an acre of land, but also its chemical constituents.

1. *Spurry* (*Spergula arvensis*). The weight of herbage and roots of green Spurry grown on one Magdeburg acre is 3500 to 4500lb. 1000lb. of the green plant consists of

780.0	lb. of water, in a fluid state
4.0	„ nitrogen
9.3	„ potash
4.3	„ soda.
2.6	„ lime.
1.5	„ magnesia.
1.0	„ sulphuric acid
1.5	„ phosphoric acid
0.5	„ chlorine.
0.3	„ alumina, iron, manganese, and silica.
110.0	„ carbon, and
85.0	„ oxygen and hydrogen

1000.0 lb.

The organic substances which are to be found in Spurry, as well as in all other plants used as green manure, do not require to be taken into account, as they become decomposed by putrefaction into binary substances; it is merely necessary to know what the substances are which, after decomposition, actually nourish the subsequent crop. Water, however, although it does not belong to fertilising substances, must not be overlooked, because on its quantity (as may be easily understood) the value of the plants to be ploughed in is, in many respects, dependent; on which account I have mentioned it in this, as in all other cases.

It we assume that the green Spurry which is ploughed in will amount (conjointly with its roots) to 4000lb. weight on one acre of land, the increase which the soil of this acre obtains will be only 400lb. carbon and 16lb. nitrogen, because all the mineral substances which it possesses have been derived from the soil. We may even assume that Spurry deprives the soil of a great portion of carbon and of some little nitrogen, and, therefore, that it is not a plant by which a soil will be much enriched. To this must be added that its roots do not reach deeper than 12 or 15 inches, so that it does not attract any considerable quantity of mineral substances from the subsoil. Nevertheless, it is worth while growing it in soils which possess but little humus, because the seed is not expensive (10 or 12lb. being sufficient per acre), and because it can be sown and ploughed in three times in one season. It is, however, to be observed, that the second crop lives partly at the expence of the first, and the third partly on that of the first and second, on which account we must not expect from the two latter crops such a great improvement of the land as from the first.

Spurry succeeds only on dry, sandy, loose soils, on which alone it can be sown to advantage. I have tried several times to grow it for green manure on humus soils, but the result convinced me that it was not worth while. This is most probably because it does not bring up mineral substances enough from the subsoil, that its proportion of nitrogen is too scanty, and that the humus which results from its decomposition is useless, because the soil has enough of that already. Spurry is mostly used for green manure in autumn, it is sown in fields which have borne Rye it is ploughed in, and Rye is sown again, which in sandy soils is continued for several years, but every two or three years dung is to be used into the bargain. We know that Spurry, considered as a fodder, is the blessing of sandy soils yet it will not succeed in all sandy soils, which is caused by their different chemical composition, one being deficient in potash, another in manganese, or other substances required for its growth.

If Spurry is used as green manure, we must guard against its being left standing till its seed begins to ripen, because, then, if it is not well ploughed in, it will spring up and choke the young Rye. It will, indeed, die by the frost of winter; but it injures the Rye materially, even in autumn. Before ploughing in (which is done to the depth of three or four inches) it is harrowed over. The field can be planted immediately after with Rye, as Spurry does not contain any substance which, before decomposition, can injure that crop.

2. *White Lupine* (*Lupinus albus*).—Although Lupines are much used in Italy and the South of France as green manure, their use is very circumscribed in this respect in the North of Europe. Mr. Wulffen, of Pitzpuhl, near Magdeburg, has acquired some celebrity by proving, on an extensive scale, that Lupines belong to the plants which are capable of improving barren sandy soils. The effects of this practice are indeed so striking at Pitzpuhl, that even the small farmers have followed his example for some time past. Mr. Wulffen has published an interesting account of his proceedings. The following are some of my own experiments, which I also have made with great success. —

If Lupines are cut when the first pods are already formed, the Magdeburg acre will yield on an average 15-16,000lb. green herbage,

1000lb. of which consist of

800 0lb. of water in three tons.

13 „ „ nitrogen (contained in the organic matter

10 „ „ potash

10 „ „ soda

25 „ „ lime

10 „ „ magnesia

18 „ „ phosphoric acid

05 „ „ sulphuric acid

01 „ „ chlorine

100 0 „ „ carbon { contained in the organic mat-

742 „ „ hydrogen and oxygen { ters

30 „ „ silica, alumina, manganese, and iron.

1000 0lb

16,000lb. of green Lupines will consequently convey into the furrow slices of one acre 70lb. nitrogen, 16lb. potash, 27lb. soda, 10lb. lime, 16lb. magnesia, 28lb. phosphoric acid, 8lb. sulphuric acid, 2lb. chlorine, and 1760lb. carbon, all which substances must have an effect on the crops subsequently grown. It is especially the nitrogen, potash, soda, phosphoric acid, and carbon, which advance vegetation. Whilst 1,000lb. of green Spurry will afford the soil 16lb. of nitrogen, 16,000lb. of Lupine will convey 70lb. to the soil—which is the best inducement to grow Lupine, because all substances containing nitrogen are essential to the nourishment of plants.

• One of the most valuable properties of Lupines consists in the roots penetrating to the depth of 24 or 26 inches, and thus bringing sub

stances to light which are as good as lost to corn crops, whose roots under ordinary circumstances do not reach deeper than 12 or 15 inches. Lupines suffer also little from heat, partly because of their deep roots, and partly because they attract much moisture from the atmosphere. This success, moreover, is the more certain because they are never laid, and do not suffer from insects. They, however, do not grow very fast, and if we want to obtain a considerable mass of herbage (say 16,000lb. per acre and more), they must be sown in the beginning of May. It is only after three and a half or four months' growth that they are fit to be ploughed in—this being the period when they form their second blossoms. If they are intended to seed, they must be sown (on dry land) in the middle of April. I have grown Lupines on a humus burning soil to the height of 7½ feet, but generally they are not more than 3 or 3½ feet high. But however well the Lupines will succeed in loamy, sandy, humus, and clayey soils, marley or calcareous soils are not at all suited to them, probably owing to their being compelled to absorb more lime and magnesia than they want—their roots emitting an acid which renders these earths very soluble in water. They succeed best on land with a subsoil containing much iron, which is explained by the fact that 1000lb. of the herbage required nearly 1lb. of Iron for its chemical constitution. Lupines are more especially useful on clayey lands, which their copious herbage and also their roots loosen considerably. The quantity of herbage is so large, that it acts (as I know from experience) in the second year, whilst the action of Spurry is gone after the first year. The Rye which I grew after Lupines stood always as well as after a strong manuring of dung. Before being ploughed in, it is best to mow them down, and draw them with a rake or some such instrument into the furrows, which will insure their being thoroughly buried. The field can be sown immediately, or it may wait a few days, till the soil is somewhat settled. As the seed of Lupines is coarse, 100 or 110lb. are required per Magdeburg acre. It is well known that no cattle will eat them, so that they can only be used for green manure. In Italy, the seeds of Lupines are deprived by hot water, or roasting, of their germinating powers, and then are used for manuring sick Olive trees, &c.; and it is probable that they will be equally beneficial to old Olive trees. (?)

3. *The Vetch* (*Vicia sativa*).—This plant is also sown for green manure, especially in the south-west of Germany. But, considering that this is best accomplished by plants yielding an abundant herbage, it is advisable to select that sort which is a hybrid between the Pea and the Vetch, and which yields a far more abundant herbage than

the common Vetch, especially if the land has been manured with gypsum.

If the common Vetch is not sown too late, the Magdeburg acre will yield, on an average, 6500 or 7000lb., whilst the hybrid Vetch will yield 8000lb. and more, herbage and roots taken together.

100lb. of green Vetch consist of

750.0	„	water in fluid state.
4.3	„	nitrogen (contained in the vegetable substances).
3.4	„	potash.
0.3	„	soda
1.0	„	lime.
0.8	„	magnesia
1.0	„	sulphuric acid
3.0	„	phosphoric acid
0.5	„	chlorine.
126.0	„	carbon
106.7	„	hydrogen, oxygen, silica, magnesia, alumina, manganese, and oxide of iron
1000.0lb		

If then green Vetches, ploughed in on one acre of land, will weigh 7000lb., the furrow-slice will obtain about 30lb. nitrogen, 23lb. potash, 13lb. soda, 28lb. lime, 54lb. magnesia, 7lb. sulphuric acid, 21lb. phosphorus, 2lb. chlorine, and 875lb carbon. That this manure is not equal to that of the Lupine is seen at once from the above, and is confirmed by experience.

If Vetches are to yield any considerable quantity of fodder, the soil must be pretty fertile. In the Rhenish Pfalz (where agriculture most flourishes) the farmers sow it for green manure in autumn amongst the stubble of Wheat, Rye, and Spelt, and it is not ploughed in till late in autumn, when bitten by frost, because in this case it decomposes better and quicker. In the following spring Barley is sown, and this green manure is considered equal to a small dressing of dung. The soil of the province consists of a fine humous loam. Before ploughing in, the field is harrowed lengthways, so that the plant may be well buried. It will not be advisable in northern countries to sow Vetches as a fallow crop, because they require, even in the midst of summer, 10 or 11 weeks' time to come into blossom. If they are sown in the beginning of April they can be ploughed in by the middle

of June, and the land can be fallowed by a second crop of Vetches, or, still better, of the larger sort of Spurry. The objections to sowing Vetches are, that they often fail, that their roots do not reach deep, that they suffer from wire-worm, and that the seed is expensive. I do not much recommend them, and there are other plants preferable for green manure. At times they are sown with Beans, when a greater mass of herbage will be obtained, the latter, however, require a yet stonger soil than Vetches. Beans, however, have this advantage, that their roots reach 6 or 7 inches deeper, and they thus loosen heavy land better. The seed of Beans, however, is still dearer.

4. *Buck Wheat*.—Buck Wheat has been often praised as a superior plant for green manure, but I have much reason to doubt it. In the first place, its success is too precarious, it yields little herbage, and that is very watery. If it succeeds well, one Magdeburg acre of land will yield on an average 1800 or 5000lb. green herbage and roots.

1000lb. green consist of

820.0 of water

2.0 „ nitrogen (contained in the substance of the plant)

1.5 „ potassa.

0.5 „ soda

1.5 „ lime

2.0 „ magnesia.

0.5 „ sulphuric acid

0.7 „ phosphoric acid.

0.3 „ chlorine.

100.0 „ carbon

71.0 „ hydrogen, oxygen, silica, alumina, manganese, and iron

1000lb

If, then, an acre yields 5,000lb. the furrow-slice will receive 10lb. nitrogen, $7\frac{1}{2}$ lb. potass, $7\frac{1}{2}$ lb. lime, 10lb. magnesia, $2\frac{1}{2}$ lb. sulphuric acid, 4lb. phosphoric acid, and 500lb. carbon, &c., which small quantities cannot produce any great result. Whenever I have used Buck Wheat for green manure, I have always returned to my former resolution, not to do so again, the result being constantly very trifling. Spurry is at any rate to be preferred, for the seed is less expensive, and its roots penetrate quite as deep into the ground. In heath-soil, however, Buck Wheat will succeed better than Spurry. I have often found by experiment that manuring it with gypsum will not improve the

former, because it obtains the small amount of sulphuric acid required for its chemical constitution from rain-water. It generally requires only the atmosphere for its growth, and can support a great deal of heat and drought; on the other hand, it is more susceptible of wet and cold than most other cultivated plants. It never suffers from wire-worm or caterpillar, in short, it is a plant which, notwithstanding its disadvantages, has also some good qualities. If it grows luxuriantly, it will destroy all Couch-grass, and generally clean the land well, but if weak, the land will become so foul as even to injure the subsequent crop. The latter must on no account be forgotten if Buck Wheat is used as green manure, and if its failure seems certain, it should be at once ploughed in. This is, in fact, a rule which ought to be observed with regard to all plants grown for green manure. Nitrogen, potash, and magnesia, seem to be the most important agents in growing Buck Wheat. If it is manured with any nitrate, it vegetates most luxuriantly, which proves that, notwithstanding its broad leaves, it does not receive much nitrogen from the air.

In the middle and south of Germany it is sown in autumn in Corn stubble, and ploughed in after having attained 1½ to 2 feet in length. In the north, however, this is impossible. It only acts during one season, which is explained by the small quantity of its chemical constituents. As it branches a good deal, it need not be sown thick, 50 to 60lbs. of seed per Magdeburg acre will suffice. Before it is ploughed in, it must be harrowed over, and a few days afterwards the crop can be sown.

5. *Rape*.—Rape may be used as a green manure on all soils which are strong enough; but on a poor soil it yields so little herbage as scarcely to be worth ploughing in. It is valuable because the seed is cheap, and it grows both late and early, and consequently feeds on the atmosphere, which costs nothing. Its roots, moreover, penetrate to some depth, and bring substances out of the subsoil, its woody roots and stems will loosen heavy land. In the Elsass it is planted for green manure after early Peas and early Potatoes, even on very sandy soils, and is followed by Rye or Wheat, which then succeed exceedingly well. If, when sown after these two crops, it does not yield any great amount of herbage, it still, nevertheless, is better than nothing; to which must be added, that the soil, if left unsown, will uselessly lose its humus—a circumstance of great importance in green manuring; because, even if grown immediately after other crops, it cannot be made use of either as fodder or dry; it still, if ploughed in, will give the soil a considerable quantity of carbon and nitrogen. If Rape is sown

in autumn, it is left till the spring; after which the field is planted with Peas, Potatoes, &c. The amount of herbage and roots which an acre will yield, may be stated at 7,000 or 8,000lb.; but if left till it is in flower, it will yield twice as much

1000lb. of green Rape consist of

770.0	„	water in a fluid form.
3.5	„	nitrogen (contained in the organic substances)
4.0	„	potassa
1.0	„	soda.
4.0	„	lime.
0.4	„	magnesia.
1.6	„	sulphuric acid.
1.0	„	phosphoric acid
1.5	„	chlorine.
140.0	„	carbon.
73.0	„	hydrogen, oxygen, silica, alumina, oxide of iron, and manganese
1000.0		lbs.

If, therefore, the acre yields 8,000lb. of green leaves and roots, the furrow-slice will receive 28lb. nitrogen, 32lb. potassa, 13lb. sulphuric acid, 8lb. phosphoric acid, 1120lb. carbon, &c., from which (especially from nitrogen and carbon) a good effect may be anticipated. In localities where wireworms occur, Rape is best sown with Oats, when 8 inches high, and between the rows, because the Rape will then grow in the shade of the Oats, and be better protected. If not too high it is rolled down before being ploughed in, otherwise it is mown and drawn into the furrow; 10 to 15lb. seed are used per acre.

6. *Rye*.—Professor Giabert, at Turin, some years since, recommended Rye for green manure. New things are mostly overrated—and so it was with Rye, some even believing that it would supersede manure altogether. But although Rye will not effect all which has been expected from it, still it possesses many good qualities as a green manure; it will succeed on very indifferent land, and is one of the earliest plants in spring. On the other hand, its roots do not reach deep, and consequently do not much enrich the furrow-slice, except with a little nitrogen and carbon; the seed, moreover, is expensive. The amount of manuring substances contained in green Rye will be equal to the ripe Rye, straw, and ripe grain taken together. It is, therefore, easy to calculate how much it will better the soil. A small quantity of potash,

soda, sulphuric acid, and common salt must, however, be added, because Rye in ripening loses a portion of these substances. When Rye is used for green manure, choice should be made of fields which are quite clean, and where a good deal of Rye has been lost at the harvest; for in this case, if the Rye-stubble is lightly ploughed in immediately after harvest, less seed will be required. After the Rye has been ploughed in, late Barley is planted, or the field may be manured and planted with Potatoes, otherwise, the practice is the same as with other green plants ploughed in.

7. *Turnip-tops and tails*.—These are used in some of the light soils of England (Norfolk) for green manure, after the parts above ground have been eaten during autumn and winter by sheep. Barley is sown afterwards, which, of course, will succeed the better if dung has also been used. But turnips may as well be sown amongst the stubble of manured Rye, and then it may be succeeded by Barley or Oats. 1000lb. of Turnips consist of

2000lb. of water in a fluid state	
2.2	.. nitrogen
0.8	.. potash
1.0	.. soda
1.3	.. lime
0.3	.. magnesia
0.4	.. sulphuric acid.
0.8	.. phosphoric acid.
0.3	.. chlorine.
50.0	.. carbon.
12.9	.. hydrogen, oxygen, alumina, silica, oxide of manganese
—	.. and iron
1000.0 lbs	

If, therefore, 10,000lb. of the tops and tails of Turnips are left on one Magdeburg acre of land, the soil will receive 22lb. of nitrogen, 500lb. of carbon, &c. To this are to be added the excrements of the sheep, which are at least worth a quarter as much as the Turnips.

In the Palatinate and the Elsass the leaves of White Turnips are used as manure, being a very indifferent food. After the harvest they are scattered over the field and ploughed in, like the leaves of Mangel Wurzel.

8. *Red Clover*.—In some countries (for instance, in the Rhenish Palatinate) Red Clover is only used as a green manure, ploughed in before it has begun to blossom.

1000 lbs. of Red Clover dried, contain—

17	lb.	of nitrogen.
20	„	potash.
5	„	soda.
28	„	lime.
37	„	magnesia.
47	„	sulphuric acid.
67	„	phosphoric acid
37	„	chlorine.
550	„	carbon.

Silica, iron, alumine, manganese, oxygen and hydrogen, make up the remainder.

When Green, it contains 79 per cent. of water, 12 per cent. of carbon. It cannot be doubted that Red Clover is a very valuable plant for green manure, as its roots reach, even the first year, two to two and a-half feet in the subsoil, and may weigh perhaps one-third as much as the leaves and stems taken together. If, therefore, the Magdeburg acre will yield 9000lb. of the latter, the whole amount of manuring substance would be 12,000lbs. The herbage of green Clover is most commonly employed, and is allowed to be 8 inches high before it is ploughed in. If the Clover is luxuriant, the succeeding crop will, in the main, be equally rich; which may be perhaps explained by the land being then clean, and containing a great mass of Clover roots, which amount at times to half of the leaves and stems, possessing probably the same constituents as the herbage.

9. *White Clover*.—This plant also is grown in some places (for instance, Westphalia) for green manure. It does not, however, yield more than one-third as much as Red Clover, to which it is otherwise inferior, in consequence of its roots not penetrating more than 12 or 15 inches in the ground. It is mostly used as manure after having been pastured for two, three, or four years.

1000 lbs. of Green Clover contain —

810.0	lb.	of water in the fluid state
3.5	„	nitrogen.
6.0	„	potash.
4.0	„	soda.

4.5	..	lime.
0.5	..	magnesia.
0.7	..	sulphuric acid.
1.0	..	phosphoric acid
0.4	..	chlorine.
110.0	..	carbon.
62.4	..	hydrogen, oxygen, alumine, silica, oxide of iron and of manganese.
1000.0	lb.	

If 1000lb of White Clover, with the roots, are ploughed in on one Magdeburg acre of land, the soil will receive 14lb. nitrogen, 110lb carbon, &c., whence we might conclude even if experience did not prove it that crops cannot be as good as after Red Clover. If, however, they do prove good after this sort of green manure, it may be owing partly to the excrements of cattle, and partly to the rest which the soil has received.

10 *Roots of Lucerne and Sandforn.*—Both these plants act on the fields where they have been ploughed in by their roots which are sometimes 20 years old, and their strong effects may be judged of by the luxuriant state of several crops grown after them. We must, however, take into account that the soil has been also manured by the leaves which have fallen during that long time. It would perhaps be possible to bring to the surface a large part of the deep roots, which are of no use to the subsequent crops, by means of such instruments as are applied in England to draw the roots of Thistles and Coltsfoot. It however remains to be seen whether the roots thus obtained would repay the labour. At any rate, idle hands might be employed about it.

11 *Roots of Grasses (turf manure).*—When an old pasture is broken up, the soil is manured by the sward, which soon decomposes, and whose effect will last the longer the older the sward is; because, in that case, it forms a close mat of roots, in which the strength of the furrow-slice has been collected as well as that of the subsoil, if such deep-rooted plants as Dandelions, Plantain, Milfoil, and Thistles, are in the turf. An old sward of Grass is, moreover, a very superior manure, because it keeps the soil (especially if light and dry) in a moist and cool condition. Such soil, therefore, if laid down with a mixture of Grasses, White Clover, &c., although used for several years as a pasture, when ploughed is followed by 3, 4, 5, crops of grain, which (after the decay of the Grasses) will grow as luxuriantly as after a full manuring, provided, however, the soil when originally laid down, was in tolerably good

condition; otherwise these very Grasses which were intended to manure the soil, will grow ill, and form anything but a dense turf. It may be assumed that the roots of a pasture 4 to 5 years old, contain as much manuring substances as the roots of Red Clover two years old.

To the plants already mentioned may be added the stubble of Spurry cut green, Vetches, and other vegetables used as fodder, the weeds that grow on fallows or in stubble. The latter are most useful when their roots reach deep in the subsoil, and so bring substances to the surface of which the furrow-slice is deficient. The green stems of Tobacco are very valuable, as they are rich in alkali and nitrogen. The stubble of plants mown green should be ploughed in as quickly as possible, in order that the humus formed by the leaves that have dropped may not be dissipated.

It cannot be doubted that many plants, not yet used, will yield good green manure, because they combine all essential properties in a high degree. The following are some with which I have made successful experiments.

1. *Tansy* (*Tanacetum vulgare*).—This plant, which is common in a wild state, and on account of its pungent smell and taste (owing to some ethereal oil) is not eaten by cattle, has hitherto been only used medicinally. If it is only used as a green manure, its not being relished by cattle is of no consequence, and is a case similar to that of the Lupine. The qualities which recommend Tansy are of much importance, viz., its roots reach 2 to 3 feet in the soil, and thereby bring to the surface important mineral substances, such as potash, sulphuric acid, phosphoric acid, etc. It is a perennial, and does not suffer from drought, wet, or cold, is never attacked by vermin, grows from the earliest spring, and yields a great mass of herbage, viz., 29,000 to 30,000lb. per Magdeburg acre, whilst Lupine, under the most favourable circumstances, will not yield more than 16,000lb. I have not yet analysed the Tansy, and am, therefore, unable to state with accuracy how much manuring substances are added to the soil by 1000lb., but some comparative experiments gave such a favourable result, that I may say that Tansy is in no way inferior to Lupines. At the end of May, 1837, I carted the first cut of Tansy on a small piece of ground, which was of the same size as that on which the Tansy had been grown. I ploughed it in five inches deep, and 8 days afterwards sowed Barley, which, from the first to the last, grew as luxuriantly as if it had been manured with dung, nay, it might be even distinguished by every one from an adjacent piece of Barley, which had been dressed with dung. In 1838, I sowed both plots with Oats, and here also that

manured with Tansy stood much better than where none has been applied.

If we then remember that one acre of Tansy yields manure for at least two acres of other land, that it is a plant most easy of propagation, as it seeds by itself, and even becomes a weed, that on proper soils it will grow for 10 years most luxuriantly, and that during that time it does not occasion any expense of labour or outlay for seed, it will be obvious that it is worth while trying experiments on a large scale with this plant. If they be successful (as I have no reason to doubt), 200 acres of bad land would not only be improved by 50 acres of Tansy, but also kept in such heart, that a dressing with Tansy would only be required every second year. The only objection to this sort of green manure is that it cannot be ploughed in on the spot where it is grown, but must be conveyed to the field. Although our native Tansy is a valuable green manure, yet the *Tanacetum boreale*, a native of Siberia, seems to be still better, as it attains the height of 7 or 8 feet, whilst ours grows only 4 or 5 feet.

2. *Mugwort* (*Artemisia vulgaris*) — This plant, which grows wild near roads and hedges, might be used advantageously as a green manure, as its roots reach 3 to 4 feet in the subsoil and thus bring substances to the surface (especially a large amount of potash), which are valuable fertilizers. It yields, even on poor loamy soils, as considerable a mass of herbage as the Lupine, as it can be mown twice a year: it lasts several years, is not attacked by vermin, nor injured by weather, and it grows from the earliest to the latest part of the year. Still, Mugwort, like Tansy, requires for its success a subsoil which contains (at least in some degree) all the substances required for vegetation, such as potash, common salt, lime, gypsum, and the phosphates. When either of these plants goes off, it is evident that the subsoil is exhausted, at least for the present, and they are then to be sown on other field. I have not made any experiments to show how crops will grow after the green herbage of Mugwort has been ploughed in, still analogy leads me to suppose that its effects will be the same as those of Tansy. Perhaps it would be best to sow Mugwort and Tansy together, as both are often growing so in their wild state. This culture is at any rate very useful, as mineral substances are thus obtained at a cheap rate, which, although amongst the indispensable nourishment of crops, cannot be applied in large quantities on account of their high price, for instance, potash, common salt, phosphate of lime, and gypsum. No doubt, besides Tansy and Mugwort, several other wild plants may be used for the same purpose, the roots of which reach deep in the soil, for instance,

Mullein (*Verbascum*) for dry sandy soils, which yields a great mass of herbage, and is very hardy, whilst some species of Cow Parsnip (*Heracleum*), would be more adapted for clayey soils.

3. *Bannatic Globe Thistle* (*Echinops banaticus*).—This plant, a native of Hungary, has been cultivated for some time past as an ornament, it is biennial, and attains a height of 8 feet. I may state that I know, from experiment, that it will be a very valuable acquisition to the farmer, as well for fodder as for green manure. As fodder it is important, because, if planted the year before, it will be 3 feet high by the middle of the following May, and furnish an astonishing mass of herbage at a period when Red Clover is scarcely 4 or 5 inches high. I have given it repeatedly to swine, sheep, cows, and horses, in considerable quantity, and have always found that it was eagerly eaten by them, even when they have had plenty of Clover. If mown when 2 or 3 feet high, it grows up again speedily, and can be cut once or twice more in the same season. Its qualities for green manure are, that its roots reach 3 or 4 feet in the subsoil, that it succeeds very well on poor loamy land, does not suffer from either frost or severe drought, is not attacked by vermin, and yields a mass of herbage nearly incredible: the Magdeburg acre will yield, if the *Echinops* is 6 or 7 feet high and about to blossom, 40,000lb. I have never grown it to that extent, still, from the ground I have planted, I have been able to judge of its fertility. It yields an astonishing quantity of seed. My experiment, as to its manuring qualities, succeeded as well as might have been expected; yet I observed that it decays underground more slowly than other plants. If it should turn out to be practically a good fodder, which I doubt the less because it is one of the Thistles with very soft small spines, the first cutting might be used in that way, and the second ploughed in green. Considering the Bannatic Globe Thistle such an important plant, I examined its chemical composition, and it will be seen from the following results how much manuring matter 10,000lbs. of the green material will furnish

1000 lbs. of the green plant consist of—

800 0lb of water in fluid form

2.0 „ nitrogen, probably.

3.0 „ potash

1.7 „ soda.

1.6 „ lime.

0.7 „ magnesia.

0.1 „ sulphuric acid

0.8	phosphoric acid
0.9	chlorine
110.0	carbon.
79.0	hydrogen, oxygen, silica, alumina, oxide of iron
—	and manganese—of the three latter substances mere-
1000.0lb.	ly traces

1,000lb. of the dry plant contain 700lb. actually nourishing material amongst which are much mucilage and albumen.

40,000lb. green herbage would, therefore, bring into the furrow-slice of one acre, 80lb. nitrogen, 120lb. potash, 68lb. soda, 81lb. lime, 28lb. magnesia, 4lb. sulphuric acid, 32lb. phosphoric acid, 36lb. chlorine, and 4,100lb. of carbon; consequently, the soil would receive from that Globe Thistle more manuring substances than from any other plant hitherto known. The small amount of sulphuric acid is remarkable.

For the sake of experiment the seed ought to be sown in May, and the plants to be transplanted in July or August, perhaps best after Rye. Although this Thistle is a plant of easy cultivation, it must be kept free from weeds although they are not likely to over-run it, its own growth being so very luxuriant. That its principal success depends on the quality of the subsoil does not require further explanation.

{ The common Magdeburg acre consists of 180 square rods or 25,920 feet Prussian, which is about $\frac{1}{10}$ of an English acre }

Plants which are used for Green manure without being sown.—In the neighbourhood of the sea and in similar places, some of these plants, which the waves have thrown ashore, or which grow in lakes and stagnant waters, yield a very powerful manure. Those which have been most used are Chara, Crowfoot (*Ranunculus*), Duck-weed (*Lemna*), Pond-weed (*Potamogeton*), Hornwort (*Ceratophyllum*), Bulrushes, and Fern.

1. *Chara* (*Chara*).—The species of this genus are all annual, and grow only in stagnant water, rich in saline matter, whence we may conclude that such substances enter abundantly into their composition. Chemical analysis confirms this, as 1000lb. of the Green Chara (*C. vulgaris*) consists of 158lb. of carbonate of lime, mostly deposited on the plant itself, 8lb. of chlorine, and 12lb. of soda. They contain, moreover, a great quantity of nitrogen, as much as 3.9lb. in 1000lb. of the green plant. No doubt they also contain much sulphur, and phosphorus in abundance, for in their speedy decomposition much sulphuretted and phosphoretted hydrogen are developed. Although growing in water, they contain a comparatively small amount of that fluid

(in 1000lb. of the green plant, 596lb. of water,) all which leads us to the conclusion, that even in small quantities they must be a powerful manure. In fact, experience has already shown, that if used too copiously they produce a too luxuriant growth. In collecting the Chara for manure, it is drawn out of the water by hooks used by a person standing upright in a boat. It is then collected on shore, either in large heaps, where it is left for some time, to rot, or is conveyed at once on the land, where it is spread thinly and at once ploughed in. The latter plan is the best, because, when Chara rots in heaps, it loses much gaseous manure, gases in the form of ammonia, sulphuretted and carburetted hydrogen, &c. The quantity of Chara required for an acre of land is 9 or 10,000lb., which is considered equal to a strong manure of dung. The crops will grow well for the next 3 or 4 years—a circumstance easily explained, because 5,000lb. of the green herbage convey 800lb. carbonate of lime and 20lb. nitrogen to the soil. Barley succeeds best after Chara.

2. *Long-leaved or various-leaved Crowfoot* (*Ranunculus fluviatilis*, *R. aquatilis*). These often grow in large quantities in stagnant water, or in slow, shallow rivers and brooks. Like the preceding, they are drawn out of water with hooks. It is best to plough them in at once, but, as they do not act as powerfully as Chara, a greater quantity must be used. In some places, they are also given to cattle as fodder. They have not yet been chemically analyzed.

Hornwort, like Chara, is incrustated with carbonate of lime and acts more powerfully. *Duckweed* deserves less attention.

3. *Seaweed* (*Fucus*).—The waves of the sea throw several plants ashore in large quantities, for instance, *Fucus esculentus*, *F. saccharinus*, *F. canaliculatus*, *F. Palmatus*, *F. vesiculosus*, and *F. serratus*, which are used as a manure with great advantage. In England, land which is in a situation to be manured with Fuci pays 25 per cent. more rent. The bladderly *Fucus* (*Fucus vesiculosus*) contains only 16 per cent. water; and 1,000lb. of the dry herbage contain 32lb. of chlorates (of lime, soda, and magnesia), 35lb. carbonate of lime, 64lb. gypsum, and 30lb. phosphate of lime. It contains also a great quantity of nitrogen, all which fully explains its high manuring properties, even if only 5,000lb. are applied to the Magdeburg acre. Its effects are somewhat increased by the numerous small sea-shells which adhere to it. It is either conveyed at once to the land, and ploughed in, or is collected into heaps for rotting, in which case decomposition soon ensues, and many fertilising gases are evolved. It is therefore best to bury Fuci as soon as possible. As their chlorides of lime and magnesia

sia attract much humidity from the air, they are best suited to dry soils. With Fuci, Seawrack (*Zostera marina*) is also driven on shore, and is, in like manner, used as manure.

4. *Mushrooms and Fungi* (Fungi).—The wise farmer who would neglect no means of increasing the productiveness of his soil, will permit nothing to be wasted, would do well to turn his attention to Fungi as a manure. In some forests these plants grow to such extent, that a person may collect one cwt. in one day. For manure, both eatable and venomous Fungi may be used, but they must be first exposed to putrefaction. They decompose very soon, during which process they evolve much ammonia, which shows the great amount of nitrogen they contain, as well as their value as a manure. How powerfully indeed they operate, may be judged from the fairy rings so often met with on pastures and meadows, which are only caused by Fungi having decayed in such places. Their use as a manure is not new; it has been known long since to small farmers in Germany. They are usually added to the dunghill, but it would be much better to mix them with humous earth and dung in the compost heap, in which case none of the ammonia produced by the Fungi would be lost. From the chemical analysis of several species of Fungi, I find that they are rich in phosphorus, sulphur, and chlorine, and, consequently, are composed of substances most essential to crops. They approach, indeed, in their chemical composition, to animal matter, and we have seen already that this affords the most powerful manures. Admitting that the large farmer can employ his people to more advantage than in collecting Fungi, it is very different with the spade-husbandman, and cottager, to whom they may be of great utility.—*From the Gardener's Chronicle, for December, January, and February, 1842-3*

Monthly Proceedings of the Society.

(Wednesday, the 8th March, 1843)

The Honorable Sir J. P. Grant, President, in the Chair

(TEN MEMBERS PRESENT)

The minutes of the last general Meeting were read and confirmed

Members Elected.

The gentlemen proposed at the last meeting were elected Members—
viz —

The Revd. James Shārpe,—Messrs. A. Sawers,—Joseph Agberg,
Edward Blyth,—Captains Frederick Elwall and F. F. B. Beatson —
Messrs. Nelson Howard,—George Wood, and Kenneth McLeod

Candidates for Election

The names of the following gentlemen were submitted as candidates
for election —

Thomas Tommoety, Esq. Deputy Collector, Boolundshahur, proposed
by the Honorary Secretary, seconded by Dr. Mouat

Col. Thomas Palmer, 15th Regt. N. I., Delhi, proposed by Major T.
E. A. Napleton, seconded by the Honorary Secretary.

Col. R. Rich, commanding at Loodiannah, proposed by Major Naple-
ton, seconded by the Honorary Secretary

W. S. Boyd, Esq. (Firm of Small and Co.) London, proposed by Mr.
Lewis Balfour, seconded by Mr. Adam F. Smith

Presentations to the Library.

1. Proceedings of the American Philosophical Society, Nos. 18 to 22
of vol. 2. *Presented by the Society.*

2. Reports on the settlement of the Districts of Agra and Cawnpore,
Presented by the Agra Government

3. The Planters' Journal 33 to 36. *Presented by Mr. G. T. F. Spracie*

4. The Calcutta Literary Gleaner, No. 1. of vol. 2. *Presented by
the Proprietor.*

5. The Indian Journal of Medical and Physical Science. No. 1 of vol.
1 of a new series. *Presented by Dr. Eulough.*

Museum.

1. Plum and Green-gage stones raised at Katmadhoo from European
trees, affording fruit of a very superior description. *Presented by B. H.
Hodgson Esq.*

2. A small supply of the "Sardah" Melon Seed of Afghanistan. *Presented by Lieut. E. K. Money.*

Lieut. Money mentions, that the "Sardah" is a remarkably fine description of Melon, far superior to any he has seen in Afghanistan or in India.

3. Specimen of Tea from Ava. *Presented by Mr. Joseph Agabeg.*

Mr. Agabeg submits this specimen with a view of obtaining a report on its quality. It is stated to have been grown and manufactured at Ava or Ameerapoora.

4. Sample of Wool shorn from Lambs of the first cross between Merino and Patna Sheep. *Presented by Mr. C. J. Muller.*

The Secretary was requested to obtain a report on these samples for the information of the present as.

The late increase of Subscriptions—postponement of the question to the next General Meeting.

The first subject submitted for consideration, was the motion of which notice had been given at the last meeting by Mr. Speede to the effect that, "the funds of the Society not appearing to require the increased subscription of eight rupees annually for support of the monthly journal, the former rate of subscription of two gold mohurs annually be reverted to."

Mr. Speede addressed a few words to the meeting in support of his motion.

The Honorable the President suggested the propriety, in consequence of so few members being present, of postponing the settlement of the question till the next general meeting.

The meeting concurred in this suggestion, and the Secretary was requested to give every publicity to the circumstance prior to the next meeting, to be held on the 12th proximo, with a view of ensuring a greater attendance.

Proposed withdrawal of prizes for imported Cattle and Sheep, and their produce.

The Honourable the President begged to call the attention of the meeting to some details connected with the prizes which have been offered by the Society during the last few years, for the purpose of encouraging an improvement in the breed of the Cattle of India. From a statement which he held in his hand it would appear, that since the first exhibition in February 1839, to that held on the 1st ultimo, a period of five years, the Cattle exhibited at each show did not average

more than twelve, and the number of sheep produced on the same occasions,—with the exception of one show,—was also very limited while during that period a sum equal to Rupees 3,900 had been expended for money prizes and for gold and silver medals.

After offering a few observations on the comparative merits of the Cattle of India and England, and alluding to the great disadvantages attendant on the rearing of Sheep within the tropics, the President stated, that he conceived the expectations which the Society had formed on the advantages which might result from turning its attention more prominently to this department of its labors, had not been realized. The Society was pledged for certain prizes for the next year, but it might be considered desirable not to extend them beyond that period. With a view of coming to some determination on the question, he would beg to submit the following proposition for the approval of the meeting —

“That it be referred to the Cattle Committee to consider and report how far it would be advisable to withdraw the premiums offered for imported Cattle and Sheep, and the produce thereof after the exhibition of 1844

The proposition was seconded by Mr. Speede, and unanimously agreed to.

Report from the Kitchen and Fruit Garden Committee

The President read a report from the Kitchen and Garden Committee, relative to the progress which had been made by them in meeting the wishes of the Society, as conveyed in the resolution passed at the last general meeting. The Report was confirmed.

Report from the Allahabad Agricultural Society

The next communication submitted was from Mr. Ledlie, Secretary to the Agricultural Society of Allahabad.

Having previously acknowledged the receipt of a small assortment of pasture grasses and grams, and a supply of New Orleans Cotton seed, which were forwarded some time ago, Mr. Ledlie writes as follows —

“On the subject of the progress, present state, and future prospects of the Society, I regret to say I have neither flattering nor encouraging accounts to communicate. An institution of the kind at a small station like Allahabad, must always be a matter of much difficulty, and liable to suspension or failure on the dispersion of the constituents of the Society, and success must be principally looked for from the

enthusiastic and energetic exertions of some few individuals who are passionately addicted to gardening.

"That these reflections are well founded, is sufficiently testified by the languid state of the Allahabad Society, consequent on the removal of a large portion of the members to other stations—the contemplated removal to Agra of nearly the whole of the remaining number, and the departure of Mr. Montgomery, the most zealous, indefatigable and active member.

"Under these circumstances, the Society before a final dispersion, have taken under consideration the expediency of engrafting their operations on the stock of Sultan Khosroo's Garden, an establishment maintained at the charge of Government under the superintendence and control of the Collector of Revenue. When these arrangements are matured and carried into effect, due information will be furnished to your Society.

"The American ploughs work well, and break the soil admirably, but as it was feared, so it is found, that the Cattle of this district are much too weak to work any length of time without breaking down."

Horticultural Exhibition at Hooghly

The Report of Dr. Esdaile, Secretary of the Branch Society at Hooghly, of the result of the Annual Horticultural exhibition, held at Hooghly on the 27th January, was next submitted. The two silver medals and the sum of fifty rupees allowed by the Parent Society, were awarded for the best specimens of Cauliflower, Cabbage, Turnips, Carrots,—also for Native fruits, Flowers and Sugar Canes. The competitors were very numerous, and the prize articles of a superior description.

Dr. Esdaile requests the assistance of the Parent Society in furnishing an assortment of seeds for their Branch Garden, and in supplying him in the proper season, with a stock of foreign vegetable seed for distribution to the Native Gardeners of the district.

The Secretary was directed to comply, to the best of his ability, with both these requests of Dr. Esdaile.

Introduction of the Thrashing Machine into Upper India

The Secretary mentioned, that it would probably be in the recollection of the members, that Mr. Tonnochy, the Deputy Collector at Boolandshahur, in a communication which was submitted at the July meeting in 1844, had requested the co-operation of this Society in procuring a Thrashing Machine from England, for an opulent Zemindar at

his district. The request was complied with, and the machine reached Calcutta at the close of last year, and was forwarded to Boolundshahur. He had the pleasure to state, that in a letter lately received, Mr. Tonnochy intimates that so soon as the machine reaches its destination, and he has had an opportunity of putting its capabilities to the test, he will acquaint the Society with the success or otherwise, of its operation.

Interesting particulars relative to an Oil-producing Seed in the District of Boolundshahur

In the letter previously alluded to, Mr. Tonnochy affords some interesting details relative to a drying oil, obtained from a seed which is procurable in the district of Boolundshahur — *For these remarks, see page 52, second number of the Journal.*

Communications on various subjects

The following communications were likewise read

1. From Dr. William Griffith, offering his best thanks for his election to the Office of a Vice President of the Society, which he considers a very honourable distinction — stating also his readiness to act on the Committees to which he has been appointed, and to give as much time as possible to the duties he has now to perform towards the Society, consistent with his other public avocations.

2. From Mr. L. Wray, of Gorruckpore, forwarding for the acceptance of the Society, the first portion of a paper, of which he is the author, entitled the “Sugar Planter’s Companion.”

3. From Mr. H. Carre Tucker, dated London, Dec. 21, 1842, drawing the attention of the Society to Liebig’s work on “Organic Chemistry, in its application to Agriculture and Physiology.” Mr. Tucker gives a brief précis of important points contained in the work, and he thinks it may be deemed worthy a place in the Monthly Journal of the Society.

The communications of Messrs. Tucker and Wray were transferred to the Committee of Papers.

4. From Mr. T. J. Finnie, dated Koorjah, Feb. 5th, offering, in reference to a request to that effect, to experimentalize on such seeds as may be transmitted to him by the Society. Mr. Finnie intimates his intention, on his return to Hummerpore, of forwarding to the Society a detailed statement of the causes which have led to the failure of their cotton crops last season, with a few suggestions on the best mode of conducting further experiments in the cultivation of Cotton.

5. From Mr. Welby Jackson, dated Cootacamund, 22nd January, intimating his intention of making experiments in the culture of flowers, fruit, and forest trees in that place, and applying for such seeds and plants as are available. Mr. Jackson mentions the situation is about 7000 or 8000 feet above the level of the sea, the soil very fine and rich, the climate exceedingly moist throughout the year, and that most of the English and Cape Fruit trees and flowers thrive with great luxuriance.

The Secretary mentioned that the request of Mr. Jackson had partly been complied with already, and that Dr. Griffith had kindly promised to promote the despatch of a supply of Himalayan trees and plants from the Saharunpore garden.

For all the above presentations and communications the thanks of the Society were accorded.

Erratum—In the Proceedings of the February Meeting, the name of Mr. G. F. Speed was, by mistake, omitted in the list of members of the Hemp and Flax Committee.

Monday, the 17th April, 1843

C. K. Robison, Esq., Vice-President, in the chair.

(SEVEN MEMBERS PRESENT.)

The minutes of the last general meeting were read and confirmed.

The gentlemen proposed at the last meeting were elected members, viz. —

Messrs. Thos. Fommochy and W. S. Boyd, Col. Thomas Palmer, and Col. R. Rich.

Captain Geo. E. Hollings, (Huggee Department,) Lucknow, was proposed as a member of the Society by Mr. D. W. Fraser, seconded by the Secretary.

Presentations to the Library.

1. Report of the Bombay Chamber of Commerce for the second quarter of 1842-43.—*Presented by the Chamber*

2. Second half yearly Summary Report of proceedings of the Ceylon Agricultural Society.—*Presented by the Society.*

• 3. The Planters' Journal, Nos. 37 to 41.—*Presented by Mr. G. T. F. Speed.*

4. The India Journal of Medical and Physical Science, Nos. 2 and 3 of vol. 1 — *Presented by Mr. G. Freleigh.*

5. The Calcutta Literary Gleaner, No. 2 of vol. 2 — *Presented by the Proprietor.*

Museum

1. A specimen of the genuine Berareea cotton, and specimens of cotton produced at Omeghur, near Agra and in the Chundelree District, from Berareea seed — *Presented by Mr. Hamilton Bell. (For Mr. Bell's communication regarding this cotton, see page 62, Original Department.)*

2. Samples of cotton produced from American seed at the Government Cotton Farms in Bundelkund, and another sample grown from American seed in Deyrah Dhoon — *Presented by Mr. T. J. Finca.*

3. Samples of wool, of the Kohistan ewe — *Presented by Major T. E. A. Napleton.*

4. An assortment of seeds of clover, lucerne, melon, beetroot, onion, coriander and capsicum, collected at Caboot — *Presented by Major Napleton.*

(For particulars relative to these seeds, see page 118, Correspondence Department, and for a short notice of the wool, see body of this Report.)

5. Seeds of two somewhat remarkable shrubs peculiar to the country between Attock and Jelkhabad — *Presented by Lieut. Vincent I. J.*

The Secretary stated, that at the request of Lieut. Lyre, he had transferred the seeds and specimen to Dr. Griffith — *(For further particulars regarding these seeds, &c. see Original Department, page 98.)*

6. An assortment of Hill seeds — *Presented by Dr. James Esdaile.*

The Secretary informed the Members that with reference to the request conveyed in his communication which was submitted at the last meeting, he had despatched a portion of this supply to Mr. Welby Jackson at Ootacamund. He also took this opportunity to mention as shewing that gentleman's readiness to oblige and meet the wishes of the Society, that Dr. Jameson, Superintendent of the Botanic Garden at Saharanpore, had forwarded some seeds direct from that station to Mr. Jackson.

7. Specimen of arrow-root, the produce of a garden at Purulea, (Choota Nagpore,) and manufactured under European Superintendence. — *Presented by Mr. F. R. Hampton, on behalf of the grower.*

8. A few capsicums much larger than the ordinary size, cultivated at Dinapore under the immediate superintendence of Mr. J. Burnell — *Presented by Mr. J. Wallagus on behalf of the cultivator.*

The Secretary intimated that he had requested Mr. Barnell to favor the Society with some seeds of this superior description of capsicum, and with his mode of cultivating it.

9. Some plants of the bhilsa tobacco, grown in the neighbourhood of Calcutta from seed obtained from the Society.—*Presented by Baboo Suttechurn Ghosal.*

In his detailed account of the culture of this tobacco, the Baboo mentions he has found horse manure to be far preferable to fresh Cow manure for enriching the earth. He applied the latter in the first instance, and it generated an insect which destroyed many of his plants, but since the application of the former has been resorted to, his cultivation has not suffered in the least, but is progressing favorably.

10. Some *Tinnevelly* senna seed.—*Presented by Mr. J. Cowell.*

Mr. Cowell intimates, that he has procured this seed, very lately, from a friend at Miras. He thinks, with reference to the superior quality of its leaf over the inferior kind produced in this part of India, the one fetching in England a price fully equal to the Alexandrian (Egyptian) senna, viz. 2s. to 2s. 6d. per lb., whereas the other will not realize beyond 5d. or 6d. per lb.,—that the seed is very worthy of a trial in the nursery of the Society.

The Secretary mentioned, that he had already distributed a portion of the seed in quarters where it was likely to be turned to good account. He had also reserved some for trial at the Nursery in the proper season, and the remainder was available to Members or others who may be desirous of cultivating the plant.*

11. A few bulbs of the "Potatoe Creeper."—*Presented by Dr. Thomas J. Smith, Civil Surgeon at Bangalore.*

12. Seed of the *Argemone Mexicana*, (Shial Kanta,) gathered at Ghazceepore, and in the neighbourhood of Calcutta.—*Presented by Baboo Rangopaul Ghose.*

(For further particulars regarding these two presentations, see body of the Proceedings.)

13. A large quantity of the prepared leaf, and several bottles of seed of the Cuba, Gibali, and Bhilsa Tobacco.—*From the Society's Nursery.*

14. A specimen of Tea, grown and manufactured at Ava.—*Presented by Captain William Spiers.*

15. A second specimen of Tea, grown and manufactured at Ava.—*Presented by Mr. Joseph Agabeg.*

16. Seed of the *Dolchos Asparagus*.—*Presented by Mr. Piddington.*

* The reader is referred to page 127 of "Correspondence and Selections," in the 3d Number of the Journal, for some further information on this subject.

"
 WITHDRAWAL OF THE LATE INCREASE IN THE RATE OF SUBSCRIPTION.

The motion of which notice was given by Mr. Speede at the February Meeting, and postponed from the last to the present Meeting, to the effect that, "the funds of the Society not appearing to require the increased subscription of eight rupees annually for support of the *Monthly Journal*, the former rate of subscription of two gold mohurs annually be reverted to," was brought forward for discussion.

Mr. Speede and the Secretary added a few words in support of the motion. After some little discussion, Mr. Speede substituted the following for his original motion; viz.—

"That the funds of the Society not appearing to require at present, the increased subscription of eight rupees annually, proposed for support of the *Monthly Journal*, that being met by the arrangements so kindly made by the Committee of Papers, without expense, the former rate of subscription of two gold mohurs annually be reverted to"

This was seconded by the Secretary, and carried unanimously

NOTICE OF MOTION.

Prospectus of a Calcutta Floricultural Society.

Mr. Speede called the attention of the Meeting to several copies, which were laid on the table, of a prospectus of a Floricultural Society, which it is proposed to establish in Calcutta, and begged leave to give the following notice of motion on the subject —

"That the establishment of a Floricultural Society having been proposed, this Society do afford the same such encouragement as may from time to time occur, by the loan of their rooms for Meetings during the infancy of the new Society, &c. under formal application for such indulgences to a General Meeting."

Nursery Garden

A short report of a visit of the Garden Committee to the Nursery Garden, on the 15th ultimo, was next read.

The Committee suggests, that although there had been but little demand for the Otahite Cane during last year, the cultivation of the most genuine specimens of that Cane should be continued, and the ground should accordingly be prepared.

It was also agreed, that some of the standing Otaberte Canes should be cleaned, opened out, and well manured, so as to ensure another good crop.

The Committee adds, that a large piece of ground has been prepared for the experiment of growing vegetable seeds.

The Report of the Committee was confirmed.

Withdrawal of Prizes for imported Cattle and Sheep.—Suggestions for the improvement of Indian Wool.—Reports on samples of Wool presented to the Society

The following report from the Cattle Committee on the question, submitted at the last meeting for their consideration, was next read:—

Report of the Cattle Committee

With reference to the resolution passed at the last General Meeting of the Society, on the 8th March, 1843, "that it be referred to the Cattle Committee to consider and report how far it would be advisable to withdraw the premiums offered for imported Cattle and Sheep and the produce thereof, after the exhibition of 1844,"—your Committee beg to state, that having duly considered the subject referred to them they are of opinion, that the attempt to improve Cattle and Sheep by money premiums and Medals has not held out sufficient encouragement, in the number of Cattle brought forward at the Shows, to induce a continuance of the Annual Exhibitions: and they consequently deem it advisable to recommend that such premiums for public competition be withdrawn, after the expiration of another year, to which period the engagements of the Society extend.

Although not within the meaning of the resolution to which their attention has been more particularly directed, your Committee do not consider it will be deemed out of place, if they bring to the notice of the Society, a subject intimately connected with their department of labour; viz. *The Improvement of Indian Wool.*

Your Committee are aware that, with this object in view, several experiments, on an extended scale, are now in progress at Cherra Poonjee, at Meerut, at Bhagulpore, and other parts of India, which, it is to be hoped, will in the course of time, introduce a new and profitable article for exportation. Indeed, it may be mentioned, that a Member of your Committee has already sent from his own flocks several shipments of the staple to England, which have given a fair remuneration

With the view of attracting as much attention as possible to this important object, and of assisting to give a stimulus thereto, your Committee would beg to suggest the propriety of offering a Schedule of Prizes for the best Samples of Wool from cross-breeds between the Merino and country sheep, as well as from other crosses. The parties sending such samples should possess, *bona-fide*, a certain number of sheep. The number required to make a candidate eligible to compete, together with other details connected with the Prizes, can be determined on hereafter, should the Society consider this suggestion worthy of adoption.

(Signed) C. K. ROBISON, V. P. CHARLES HUFNAGLE,
 W. M. STORM, C. R. PRINSEP.

Resolved—That the Report of the Committee be confirmed, and that with reference to the suggestion contained in the latter part thereof, they be requested to submit a detailed report, embodying a Schedule of Prizes, &c. for the information of the Society.

In connection with the subject under consideration, the Secretary begged to submit the following extract of a letter from Major Napleton, at Bhagulpore, together with a report* with which he had been favoured by Mr. Robert Smith, on the sample alluded to. "I brought with me from Cabool some Kohistan Ewes, which have some very fine Lambs, some Cabool Dhoombas, some Punjaub Wethers, &c. and I wish to know if there are any Prizes I could compete for at the Agricultural Shows. There is a remarkably fine breed of Sheep to be procured near Monghyr, and I have some now in prime condition, having been 18 months on Gram and Bhoosa, and if there is any Prize for the finest and best fed Country Sheep, I feel confident I could carry it off. The fleece of the Kohistan Ewe is large and fine, and I have several pieces of cloth called Burruck, made from the wool. I am thinking of sending you some Wool, that its merits may be tested."

The Secretary stated, that he had submitted the sample of Wool, (the first cross between Merino and Patna Sheep,) which was presented by Mr. Muller, at the last meeting, to Messrs. Adam F. Smith and Robert Smith, and both gentlemen had been so good as to favor the Society with their opinion.

Mr. Adam F. Smith states, that he considers the sample a very creditable one for a *first* cross between a Merino Ram and Patna Ewe. The

* For this report see page 153 of "Correspondence and Selections."

wool is of fair staple, and has a soft silky feel—it is in short, not unlike the F.'s and S.'s of some of the best marks of Spain.

[For Mr. Robert Smith's opinion, see page 159 Correspondence Department.]

Report of the Kitchen and Fruit Garden Committee.

A second report of the newly formed Kitchen and Fruit Garden Committee was the next paper submitted.

The Committee intimate, that having carefully examined the statement of foreign and indigenous vegetables and fruits, with their usual, as well as early and late, periods of production, which, at their former meeting they had directed to be prepared, and having taken into consideration other subjects connected with their enquiry, they now beg to submit the following suggestions to the Society:—

1st. That an exhibition of fruits and vegetables, foreign and indigenous, be held about the middle of next month.

2d. That prizes to the amount of 150 Rs., or thereabouts, and six silver medals be awarded according to the list appended to this report.

3d. That this list be translated into Bengallee, and copies circulated to the Native Gardeners.

4th. That two more exhibitions be held this year in the early part of July and October.

5th. That in lieu of an Annual Show, quarterly exhibitions be held in future, on the first month of each quarter.

6th. That the sum of 800 Rs., or there about, and a grant of silver medals to the value of 200 Rs., in all 1000 Rs. per annum, be placed at the disposal of the Committee, for prizes to be awarded at such quarterly exhibitions.

On the termination of the persual of the above report, the subject underwent discussion, and it was the opinion of the Meeting, that although it was desirable that some change should be made in the present system, yet as the question involved an outlay of money, it would be better to refer it, in the first instance, for the consideration of the Finance Committee. The report was referred accordingly.

Mr. Speede begged leave to give the following notice of motion on the subject:—

“That the report of the Kitchen Garden Committee be taken up and disposed of at the next Meeting, provided there be nothing in the Finance Committee's report (to which it is now referred) to exhibit the proposal as objectionable.”

Report on Samples of Tea, grown and manufactured at Ava.

The Secretary stated, that he had submitted the sample of tea which was presented by Mr. Agabeg at the last meeting, together with the sample since received from Captain Spiers, (both of which are said to have been grown and manufactured at Ava,) to Mr. Rennie, of the firm of Lyall, Matheson and Co., and that gentleman had favored the Society with a report thereon, which he had now the pleasure to lay before the meeting.—(See page 161 Correspondence Department.)

Withdrawal of Free Postage from the Society.

The Secretary stated, that he had been requested by the Honourable the President to submit, for the information of the Meeting, the following Correspondence with Government, relative to the late withdrawal from the Society of the privilege of free postage —

G. A. BUSHAY, Esq.

Secretary to the Government of India, General Department

SIR,—I was requested by a Meeting of the Agricultural and Horticultural Society of India held in December last, to transmit to the Government a copy of a Report of the Finance Committee of the Society on the withdrawal by Government of the privilege of free postage for the Society's Journal and Correspondence, in order that the Government might know the extent of the loss the Funds of the Society sustain by the withdrawal of the privilege they have so long enjoyed.

I did not make this communication at the time, because I thought it necessary to refer back to the Finance Committee, in order to ascertain whether there were not other facilities of Dak and Banghy conveyance withdrawn, the future expence of which was not included in their report.

The additional discouragement offered to the usefulness of the Society by the withdrawal of these other facilities formerly enjoyed and noticed in the report of the Finance Committee, are accordingly stated in the Annual General Report of the Society's proceedings.

I have now the honour to inclose for the information of His Honour the Vice President in Council, an extract of the proceedings of the General Meeting of the Agricultural and Horticultural Society of India, held on 14th December 1842, and an extract of the Report of the Society for the year 1842

From these papers it will appear to His Honour, that an expence of certainly not less than Rupees 1,000 per annum is for all future years deducted from the funds to be devoted to its legitimate object,—the improvement of the produce of the soil from which, by a direct taxation, the whole of the revenues of the Government are derived, and that the transmission of agricultural seeds to the interior of the country will be greatly curtailed, if not, as is most probable, nearly put an end to.

The Society conceive that they have done their duty in laying these facts before His Honour, the Vice President in Council.

I have, &c.

(Signed) J. P. GRANT,

President Agricultural and Horticultural Society of India

March 4, 1843.

TO THE HONORABLE SIR J. P. GRANT, Kt.

President of the Agricultural and Horticultural Society of India.

HONORABLE SIR,—I am directed to acknowledge the receipt of your letter dated the 4th instant, transmitting an Extract from the Proceedings of the General Meeting of the Society held on the 14th December last, with a copy of a Report by the Finance Committee of the Society, on the withdrawal by Government of the privilege of free postage for the Society's Journals and Correspondence, in order that the Government might know the extent of the loss the Funds of the Society will thereby sustain.

2d.—These papers having been laid before the Government of India, I am directed to state, that His Honour in Council regrets, that consistently with the just demands of the State, he cannot alter the orders already passed on the subject.

I have, &c.

(Signed) T. R. DAVIDSON,

Officiating Secretary to the Government of India.

Council Chamber, the 15th March, 1843.

Reply from the Home Government to the Society's application for further pecuniary assistance, and for free transmission of Seeds.

The Secretary mentioned, that it would be in the recollection of some of the members present, the resolution that was agreed on at a general meeting of the Society in September, 1841, to address the Honorable the Court of Directors, through the Local Government, with a view of

obtaining further pecuniary assistance, and the privilege of receiving seeds from England free of charge, by the Mediterranean and Red Sea Steamers. Letters on both these points were accordingly forwarded to the Honorable Court, and he now begged to submit the following reply on the subject :—

TO JAMES HUME, ESQ.

Honorary Secretary to the Agricultural and Horticultural Society.

General Department.

SIR,—With reference to the letter and its enclosures from the late Secretary to the Society, dated the 13th September, 1841, I am directed by the Hon'ble the President in Council to transmit for the information of the Agricultural and Horticultural Society, the annexed copy of Paras. 36 and 37, from a letter from the Honorable the Court of Directors in the Public Department, No. 25, of 1842, dated the 21st December, replying to an application from the Society for an addition to the present annual Government contribution, and for permission to receive their annual supply of Seeds by the Mediterranean and Red Seas

I have, &c.

(Signed) H. V. BAYLEY,

Deputy Secretary to Government of India.

Council Chamber, the 1st March, 1843.

Extract of Letter, No. 25, of 1842, from the Honorable the Court of Directors, in the Public Department, dated the 21st December.

Forwarding an application from the Agricultural and Horticultural Society of India, for an addition to the Government's present annual contribution of Rs. 2,560 per annum, and for permission to receive their annual supply of Seeds by the Mediterranean and Red Sea.

36. The bulk of the annual supplies of Seeds required by the Agricultural and Horticultural Society is far too great to admit of their being forwarded by the Steamers via Bombay, and across the Continent of India, to Calcutta.

37. We shall, however, be disposed to meet the wishes of the Society to a certain extent, when the direct communication between Suez and Calcutta, by Steam, is effected, and shall take opportunities of sending occasional supplies of such seeds, as are deemed of importance, by the most speedy conveyance.

True Extract,

(Signed) H. V. BAYLEY,

Deputy Secretary to Government of India

Further account of operations at the Government Ginning-works in the Doab—Establishment of Ginning-house, in the North Western Provinces.—Proposed introduction of a superior description of Cotton Gin.

The paper that was next submitted, was a long and interesting communication from Mr. Finnie, in charge of one of the Government Cotton Plantations in the Doab, (dated from Cawnpore, March 11th,) detailing the causes which have led to the failure of their Cotton crops during the last season, with suggestions for conducting further experiments in the cultivation of cotton *.

Mr. Finnie states, that he has taken a long tour through the N. W. Provinces, and has observed particularly the capabilities of the country, even under native management for the production of the common native cotton, which is acknowledged to be a very useful and acceptable article to the English manufacturers, if it could be had in a marketable condition. "Then," observes Mr. Finnie, "if it be an object to supply the English market with cotton from India, let Government and our private capitalists establish Ginning-houses in almost every thickly inhabited part of India, and contract with the people for cotton, according to its *cleanliness and quality*, to be delivered at the Gin-house in the seed; and I doubt not any quantity could be procured of a quality peculiar to the country and climate in which the Gin-house is situated. Create a sure market for their produce at their doors, and the people of India will soon avail themselves of it, and but a few years will elapse before the good effects of the measure will be perceptible in the market. In connection with the Gin-house, there might be a small model plantation to prove to the people, that by cultivation much more will be produced than without it, and a plough manufactory would advance the cause much, for it is evident that no benefit can result from placing a better mode of cultivation before them, unless you at the same time place the means of adopting it in their power, by supplying them with ploughs, &c., at a cheap rate.

I hope now Lord Ellenborough will think the system of cultivation and ginning is worth extending all over the country, and that we shall have a Gin erected at Agra, one at Hummeerpore, one at Goruckpore, one at Mirzapore, and one at Saugor. At the two latter places there is

* This communication has been inserted in the Third Number of the Journal.

† In a later communication Mr. Finnie mentions, that the Governor-General has directed this suggestion to be carried into effect.

no one who knows how to set them up, or to regulate the draft to separate the trash, motes, &c., from the cotton."

At the close of his letter, Mr. Finnie adds, "I saw a good cotton from the American seed growing in the Doon, as is usually produced in Mississippi and Louisiana. I send you a lock to compare with that produced in the plants, it was produced without care, and is some of the last bolls from the shrub."

The Secretary intimated that these samples had been received. He had shewn them to a good judge of the staple, whose opinion coincided with that given by Mr. Finnie.

The best thanks of the Society were accorded to Mr. Finnie, and his communication was transferred to the Committee of Papers.

In reference to that portion of Mr. Finnie's paper relative to the proposed establishment of Ginning-houses at the Principal Cotton Marts of the Upper Provinces, the Secretary begged to draw the attention of the meeting to the following letter from an American gentleman, to his address —

To the Secretary of the Agricultural and Horticultural Society of India

DEAR SIR,—HAVING seen by various reports made to your Society which you have kindly submitted to my inspection, that the Society has long been deeply interested in the improvement of the culture of the cotton plant in this country, and that a machine for separating the cotton from the seed, as well as from foreign substances, *without injuring the staple*, would be a great desideratum, I beg leave to address you the present, hoping that I may have it in my power to supply that which has so long been sought after.

A Cotton gin has recently been invented in America, which seems peculiarly adapted to the use of the Planters of India. Its principal characteristics are, that it removes the fibre from the seed more perfectly than any machine known, clearing it from dirt and trash, and giving it much the appearance of hand-cleaned cotton. One good hand can turn out 150 to 200 lbs. of clean cotton per diem, or thereabouts. This point is not accurately ascertained, for as yet only the model gin has been tried. Its cost will be less than one-half of that of Whitney's 60 saw-gins, say from 300 to 400 rupees each; but much, on this head, would be dependent upon the number that could be sold. As a patent right will be taken out for the invention, I am not at liberty to enter into any detail of its construction, but as a proof of its superiority will mention the fact, that two sample lots of cotton, were sent to Mobile, Alabama, grown on the same estate and taken from the same

heap, the one ginned by Whitney's saw-gin, the other by the one above referred to, and the sales of the said lots were as follows, viz.

Cotton ginned by Whitney's gin.....	8½ cents. per lb.
Ditto ditto new model gin,	3 „ „ „
<hr/>	
Difference in favour of the latter,	4½ „ „

It is my intention to take with me, on my return to America, several bales of the best native-seed cotton, in order to test the capacity of the gin for cleaning short staple cottons, as well as samples of the same cottons cleaned here by other means, to ascertain by comparison of cost of machine, quality, and quantity of production, whether the gin is likely to answer the purposes of India Planters generally. For cleaning the *improved* cottons of this country, I can unhesitatingly pronounce in its favour, the latter differing but little from Georgia and Alabama Uplands.

What I would respectfully request of you, is to inform me, whether in the opinion of the Society, even should the gin in question answer every expectation, there will be sufficient encouragement held out to an individual embarking in this operation to authorise the necessary outlay for the manufacture and export of the machine; whether (as the native cultivators are too poor to purchase *any thing* at such a price) it is probable that Europeans would be found willing to establish ginning factories on a large scale, in the greatest cotton grown districts, buying the seed cotton from the ryots, and cleaning and shipping it themselves. This seems to me to be the only feasible plan, and one which could not fail, not only to give a good return to any one embarking in the enterprise, but one which would greatly benefit the cotton interests of India, at large. Lastly, if the Society would be willing to address the Government on the subject, and ascertain whether any encouragement could be hoped for from it, should the experiment be successful.

If the trials made in America upon the short staple cottons prove favourable, I should wish, before embarking largely in the business, to obtain the opinions of some of those gentlemen in Great Britain, who have interested themselves so much in this business, relative to the amelioration of the quality of the native cottons by the new process of ginning. To do so, I should send them samples of India cotton ginned by different gins, and would therefore request, that you would be kind enough to give the address of one or two of them, with whom if successful, I may confer.

have, &c.

Calcutta, April 2d, 1843.

(Signed) W. McMEIKEN

At the close of the perusal of the above important communication, the Secretary was directed to convey to Mr. McMurtrie the thanks of the Society, for having brought the subject matter thereof to its notice, and to inform him that the Society is very willing to co-operate in advancing this much-to-be-desired object, and that in the event of the proposed experiment proving successful, on receiving intimation thereof, with samples of foreign and native cotton cleaned by the machine, it will be prepared to communicate with the Government on the subject.

The Secretary was further requested to afford such assistance as may be required by Mr. McMurtrie, with reference to the concluding portion of his communication.

Seeds from Afghanistan—Mode of cultivating Lucerne, Clover and Melons

The Secretary stated, that the next paper he had the pleasure to submit, was a communication with which he had been favored by Major Napleton, regarding the seeds already alluded to among the presentations. Major Napleton states, that the seeds are quite fresh, and were collected by him at Cabool with great care, and not without a good deal of difficulty, as the shops in the city of Cabool were all deserted, and the inhabitants had fled to the Hills.

Particulars regarding the Potatoe Creeper --Extended Culture of the Hop Plant, and the Strawberry, at Bangalore

The Secretary mentioned, that having observed in one of the public prints an account of a singular esculent vegetable named the 'Potatoe Creeper,' which was stated to have been lately introduced into the Mysore country, and likely to prove a very useful addition to the Kitchen Garden, he had addressed a correspondent of the Society, Dr. Smith, the Civil Surgeon at Bangalore, on the subject, with the view of obtaining a few of the bulbs or roots of the vegetable for trial at the Nursery. He was happy to state, that Dr. Smith had been kind enough to give immediate compliance to his request, and the bulbs had arrived in excellent order, and been planted out in the Garden.

The Secretary intimated, that he was endeavouring to comply with Dr. Smith's request for some strawberry seed, and hopes to be successful. He had moreover asked Dr. Smith to forward for the Society, a small box of hop cuttings to the Agricultural Society at Madras, by whom the plants could be despatched by ship to Calcutta.

[For these two communications of Major Napleton and Dr. Smith see pages 118 and 126, of the Correspondence Department.]

Value of the Seed of the Argemone Mexicana, (Shial-Khanta,) for producing Oil

A letter from Baboo Ramgopaul Ghose, which accompanied the seed of the *Argemone Mexicana*, before mentioned, was next submitted.

The Baboo mentions, that when lately traveling through the Upper Provinces, his attention was drawn, at Meerut, to a plant which was stated to produce an oil seed. Recognizing the plant as a common weed of Bengal, as well as of the Upper Provinces, he did not at the time notice the circumstance. On reading, however, the communication of Mr. Tonnochy, as embodied in the proceedings of the Society for March, it struck him that the plant which had been pointed out to him was identical with that alluded to by that gentleman, this induced him to make further enquiries, and to collect a quantity of the seed at Gazeepore, where he found it to be growing in abundance, and learnt that the natives are not only aware of the plant producing an oil seed, but that the lower orders of the people, especially boatmen, are accustomed to use the oil for their lamps.

After giving a description of the plant, and stating that the natives in and about Calcutta do not appear to know the use to which the seed can be applied, Baboo Ramgopaul Ghose adds the following —

"It was only yesterday, after I had written the greater part of this letter, that I came to know that Mr. Tonnochy's seed is not the same as mine, as I had erroneously supposed, and this has made me the more anxious to communicate with you. I do not know the comparative merits of the two seeds, I have made no experiments—indeed I felt no inducement to do so, as under the above wrong impression I thought it unnecessary. since Mr. T. had already taken judicious steps for testing the quality of his oil. There is evidently a large quantity of oil in the seed I now bring to the Society's notice, and as the plant grows spontaneously throughout the Bengal and Agra Presidencies, and perhaps throughout India, it may be safely concluded the cost of production would be small, nor would it, I think, be premature to entertain the hope that this black seed might, in the course of a few years, become a considerable article of commerce, even if the quality of the oil should not prove of a superior description.

"Entertaining these views, I have ventured to address the Society through you, in the hope of drawing the attention of practical men to the subject of this communication."

In reference to the above communication, the Secretary brought to the notice of the meeting, that the *Argemone Mexicana* is alluded to by

Professor O'Shaughnessy, in his Dispensatory. The Professor there states, "that the seeds are used in Jamaica as an emetic, and they are described as being more powerfully narcotic than Opium, but that he has subjected the seeds to numerous experiments, and has never found them to shew any emetic or narcotic influence, they contain a bland oil resembling that of the Poppy, and which can be used in ounce doses without producing any purgative effect. The juice which exudes on wounding or bruising the plant, is of a bright yellow colour, and is used by the natives as an application to indolent ulcers, and to remove specks on the cornea. It has by some been described as possessing the activity of gamboge."

Communications on various Subjects.

1. From Captain G. E. Hollings, Secretary of the Branch Garden at Lucknow, stating that almost all the vegetable seeds, (English, American and Cape,) received last year from the Society, have succeeded admirably.

Capt. Hollings mentions, that the Garden is progressing very well, and asks for a supply of seed.

2. From Mr G. Eveleigh, giving extract of a letter from his relative Mr P. b. Borcherd, President of the Agricultural Society at the Cape of Good Hope, in which is expressed a wish to correspond with the Agricultural Society of India, and to interchange literary productions.

Mr. Eveleigh kindly offers to be the medium of communication between the Societies.

The wish of the Cape Agricultural Society was unanimously responded to, and thanks were directed to be returned to Mr Eveleigh for his obliging offer.

3. Extract of a letter from Mr. James Cowell was read, suggesting that, the Society should endeavour to obtain,—as it would be likely to prove an extremely important introduction,—some pods of the Cacao or Chocolate Nut from the West Indies or Brazil. Mr Cowell adds, that he has been endeavouring to get some for the Society, but as yet without success, and he fears his inability.

The meeting coincided in the opinion of Mr. Cowell, and the Secretary was requested to communicate with Mr. Stikeman, Secretary of the East India and China Association, on the subject.

4. From the Secretary of the Royal Horticultural Society of Cornwall, returning thanks for a copy of the eighth volume of the Transactions of the Agricultural Society.

5. From Mr. Archd. Sconce, forwarding a copy of the prospectus of a Joint Stock Company, established at Chittagong, for the cultivation of Coffee.

Mr. Sconce states, that hitherto the plantation which, as may be expected, is on a small scale, has been most promising. The plants are healthy and luxuriant, and lately every bush was full of blossom.

For all the foregoing communications and presentations, the thanks of the Society were accorded

Correspondence and Selections.

REMARKS ON SUGAR AND COFFEE CULTURE AT AMHERST, ON THE
PENINSULAR COAST.

*Communicated in the following letter from EDWARD O'RILEY, Esq.
dated Decr. 18th May 1843.*

By the *Sarah* I have the pleasure of receiving your letter, dated 26th ultimo, requesting any information in addition to my former communication on the subject of coffee cultivation, that it is in my power to afford.

The limited experiment which afforded the data for my remarks to the Society referred to by you was, I am, sorry to say, not carried out to the extent I could have wished in consequence of more pressing matters demanding my attention. To ensure some attention being paid to the plants, I distributed small plots of them to the sugar-cane cultivators in the vicinity, and instructed them to keep the jungle clear around them. During my absence, however, with the true apathy of a Birman, the spot was allowed to be overrun with weeds, and the plants met the common fate of the jungles in this vicinity, which are annually consumed by fire. A few of the trees, however, had been transplanted into the sugar-cane gardens, and, from being well sheltered from the force of the rainy season, have produced a good average crop, although stunted from the effects of the transplanting at such an advanced age of the plant, which could not have been less than two years. Some of the plants in question threw their blossoms within the two years, and being early in the season, and not sufficiently sheltered from the force of the rains, they were stripped ere the seed vessel had formed; this may be obviated in future by observing the great desideratum of sufficient protection

* This communication is published in the sixth volume of the Transactions of the Society.

from the larger forest trees, when choosing a site for a cultivation of the kind. From my experience of this coast, I feel convinced that by a judicious selection of situation, and the requisite arrangements as stated in my paper published in the Society's Transactions, a coffee cultivation can be as successfully carried on here as in any other part of India. Chittagong, from the circumstance of there being less continued rain than on this coast, I should be inclined to prefer especially so, if a *granitic formation* of any moderate altitude be available in the vicinity of the Sea Coast! From the pervious nature of the sub-soil which this formation affords by its decomposition and the usual rich layer of vegetable mould which accompanies it there can be no doubt of its being *the best soil for a coffee cultivation*.

You must kindly excuse the imperfect way in which I have remarked on the subject in answer to your letter, should however any particular point occur to you, as requiring more explicit detail than I have hitherto made, I shall be most happy to remedy the omission, and in fact, afford any information it is in my power to give

My attention is devoted solely to the extension of the sugar cultivation of this place and after several years' application, you may form some idea of my success, when I state, that from a few small gardens of cane, grown by the natives for sale in the bazar, I have accomplished a cultivation this season, the out-turn of which at the lowest average, will not fall short of *ten millions of canes*! Obstacles of no trifling nature have, as a matter of course, been met with, which however have been surmounted, but besides the principal object of extending the cultivation, there still remains a wide field for improvement in the *method* of cultivation observed by the natives. With every advantage of soil and season, and a fine hardy cane for plant, which stands uninjured a three months' drought, the cultivators pay little regard to the cane after planting, the consequence is, a deterioration in size and a very trifling crop of 3rd rattoons: this I have pointed out, as well as the way to improve it, which will afford ample remuneration for the extra trouble bestowed, their cupidity once aroused, I have no doubt of being able to accomplish so desirable an object, time and patience however are requisite to deal with the character peculiar to a Burman

The subject of sugar cultivation has been treated so ably by far more competent persons, as published in the Journal, that there remains nothing to be said by me, that would at all interest you; I shall therefore refrain from any remarks thereon, until I can do so instructively.

It is my intention to induce a cultivation of other articles of produce, viz. arrow-root, hemp, and the indigenous kind of indigo of this coast—the whole of which thrive well, and on this subject, I shall have occasion to address you more particularly by and by.

SECOND REPORT ON THE GARDEN OF THE LUCKNOW HORTICULTURAL
SOCIETY AT LUCKNOW.

*Communicated by Captain G. E. HOLLINGS, Secretary of the Society,
in the following extract of a letter, dated 5th May, 1843.*

I have to thank you for yours of the 27th April, and to assure you that I feel much obliged for the supply of seeds which you purposed sending to me. I shall have much pleasure in reporting progress after they are once put into the ground.

In looking over some old numbers of the Society's Journal, I find that in 1838, some anxiety was shewn regarding the success of the asparagus from the American seed, and am in consequence induced to mention, that the American seed you sent to me, has not only germinated, but borne transplanting uncommonly well, and I am in great hopes that in two years, I shall be able to produce the finest asparagus ever seen in this part of the world. We are still getting cabbages from the English and Cape seeds. Of all the seeds you formerly sent, the cucumbers are, I think, the only ones that failed, which I attribute to their having been placed in the ground too soon. Being but a recruit as regards horticulture, I have had every thing to learn, and am not inclined to be dispirited at occasional failures: my first great object was to get the establishment in good working order, the cattle into condition, and to see that the ground was properly tilled, manured and watered. As far as my present knowledge extends, I have derived more assistance and information from a perusal of the

Georgics, than all the other books I have yet read. The next point to which my attention was directed is described in the text:

" Infelices ramos falce amputans,
and
" Divise arboribus patrie

I laid a heavy hand on all our luxuriant branches; peach trees, vines, mangoes, custard-apple, guava, apples, alloo-bokhara, orange, lemon and citron were all equally exposed to the relentless knife; almost every tree, shrub and perennial flower felt its salutary edge; violet and strawberry roots were recklessly separated from their anxious parents; arrow-root divided into tubers; the loquats, pears and a species of small plum trees have escaped for the present; but I anticipate cutting them down next year.

The study of the different climates required for different trees is a difficult one, and as yet I have made but little progress, although not altogether unsuccessful. I have a very promising series of pine-apple plantations from crowns which I got from the Goruckpore district, and the few plants which remained from former experiments, after having been given over, have wonderfully recovered. The plant which several besides myself consider is the "*orchis mascula*" thrives admirably; the seeds of the Cabool grape which Sir William Nott gave me have germinated, as also some from the grapes sold in boxes; three small roots of ebony trees have put forth shoots.

There never was a finer season for fruit *à la* mangoes (*grafted*) peaches, grapes and alloo-bokharas in the Horticultural garden, than the present, although there appears to be a general failure in the King's garden and elsewhere, which of course I attribute to the care taken in pruning, watering and manuring the trees, and keeping their stems clear, and frequently turning the ground, as well as an active superintendence which I owe to the native Darogah, whom I had formerly known for some years as Chowdry of a regimental bazar.

In addition to the success that has hitherto attended my humble efforts with regard to vegetables and fruit trees, I have been fortunate in securing the propagation of several flowers, especially the violet, honeysuckle, carnation, two varieties of the "*Pandanus odoratissimus*" of Roxburgh, called by the natives Keora and Kantke, the "*Micheia champaca*" commonly known as the Chumpu or Chumpuk, and different kinds of lily. I have also succeeded in get-

ting English myrtle from ships. I have every reason to suppose, that I shall be able to multiply the teak tree by the same process, as the cuttings which I planted are sprouting. I have used several kinds of manure, animal and vegetable, without yet experiencing any failure. By the application of lime and assaetida, I have hitherto kept white ants at a distance, and found the application of soap sud-efficacious in keeping off insects of every description. The composition recommended by Forsyth has prevented any bad consequences from the rising of sap after the amputation of large branches, which was necessary in consequence of the damage caused by high winds, &c. &c. I have mentioned all these circumstances with the hope, that my experience may be of advantage to others: for I am convinced that there is no point of greater importance than the improvement of the Agricultural and Horticultural resources of a country, which must always form the principal source of its wealth; but the point to which my attention has been principally directed, and in which I have a sanguine hope of succeeding is, in addition to the extensive distribution of seeds and plants of an improved kind to make the garden support itself, and to ensure the accumulation of funds to enable us to turn to account every portion of the extensive grounds on which it consists. We have never asked for, or required any pecuniary assistance from the parent Society; a part of the money so liberally given by one of the late kings of Oude, its original founder, Nusseer-ool-deen Hyder, is still invested in Company's paper. From the limited number of our Society the annual contributions are necessarily small, but owing to the exertions of my predecessors, the soil is in a state to give forth its increase liberally, and I am convinced that with tolerably good management and careful superintendence, our success will be complete. Hitherto we have experienced great advantages, and for the future we must rely on our own exertions.

So much for our own affairs, now for your commissions.

I have despatched a small quantity of arrow root for examination.* From a personal knowledge of the climates and soils of Allahabad,

* This arrow-root has been examined by Dr. Meunier, who states that, it "requires a good deal more care and attention in its preparation, before it can become an article of commerce, or compete with the better kinds found in the Calcutta Market. It has a disagreeable smell, is not sufficiently washed and dried, contains insoluble matter, and would not keep for any length of time, without injury to its flavour and nutritious qualities."

Bheerboom and Chotah Nagpore. I am inclined to think, that ours will be found of a better color and more nutritive—the crop now on the ground is sprouting most vigorously. I have never allowed my violets to go to seed, the flowers being in great demand, but a friend has kindly undertaken to send for a supply, which shall be forwarded to you without delay. Although violets love a damp soil, I am afraid that of Bengal will be too wet for them and for strawberries, to which the above remark equally applies, a considerable quantity of sand, burnt bones and ashes are mixed with the soil. I am disposed to think that you will never be able to raise a second crop of strawberries, which is gathered here in the hot winds, but if proper care is taken, you ought to have a fine crop in February. I am very doubtful of being able to procure strawberry seeds,* but if you wish, I will take advantage of a boat returning to Calcutta to forward some plants of strawberries and violets. It occurs to me to mention, that Mr. Speede's book on gardening, which must be valuable in Bengal is of very little practical use in this part of India, where the climate, soil and seasons are so different. Here, all productions that require a light sandy soil thrive naturally, all kinds of vegetables, especially potatoes, cabbages, cauliflower, lettuces, &c., attain great perfection in all parts of Oude. Trees requiring a deep rich soil flourish remarkably well beyond the Gogra. Grain of every kind is produced abundantly in what is called the Gaugur country, between the Choukie and Goomy, over which there is a rich black alluvial soil. Rice and hemp are produced *ad infinitum* between the Gogra and Rapti and the Terrace, which runs along the Nepal frontier. It is in this part of the country that the supposed "*Oreus mascula*," the "*phalsa*," (*Grevia asiatica*) and an infinite variety of the most beautiful shrubs are found in the immediate vicinity of the saul, sissoo and sakoo forests, in which ebony and caoutchouc trees are occasionally met with. In the neighbourhood of Lucknow, where the soil is particularly sandy, the trees and shrubs which spring luxuriantly in Bengal, require great attention and an artificial soil, rich manure and frequent watering, and although the common mangoe is indigenous, and to be found in great abundance,

* Since the date of this letter a plentiful supply of Strawberry seed has been obliging presented to me by Capt. H. Bangs.

the grafts require to be most carefully tended to ensure any thing like good fruit, whilst apple, pear, pomegranate, and plum trees seldom produce good fruit. Having enjoyed the Sylhet orange in its greatest perfection at Churrah Poonce, I cannot say much in favour of those grown here, although I have heard that there is one species which is particularly delicious. There are sixteen hundred trees of different kinds, in all of which the fruit has set in our Horticultural garden. I shall perhaps be able to give a better account when it is ripe.

I believe, I mentioned in my last letter, that although the country generally has benefitted by the introduction of foreign sugar-cane, our own supply has been exhausted, owing principally to the destruction caused by white ants. I regret to say that the small quantity put into the ground this year, was planted without my knowledge, and therefore I had no opportunity of trying the efficacy of dipping the cuttings into lime or resatetida previous to planting, and the consequence is, that a very small portion of that which was planted has come up.

REPORT OF PROCEEDINGS OF THE BRANCH AGRI-HORTICULTURAL
SOCIETY AT BHAUGULPORE.

*Enclosed in the following letter from Major T. S. A. NATION,
Secretary of the Society, dated the 22d May, 184*

I have the honor to acknowledge the receipt of your letter, under date the 12th instant, and to convey to the Honorable the President and Members of the Agri-Horticultural Society of India, the best acknowledgments and thanks of this Institution, on the occasion of its having been constituted a Branch Society, and further, to express the satisfaction it has derived from their proffered assistance in carrying out the views and useful objects of this branch of the parent tree.

The box of seeds alluded to in Your letter, will indeed be most acceptable, and the Honorable the President and Members may rest assured, that this solid mark of their kindred is duly appreciated at Bhaugulpore.

I have the pleasure to enclose a report of our first show of flower, fruits and vegetables, likewise a list of extra donations and additional monthly subscribers, since our first proceedings were forwarded to you, and trust the progress we are making will prove satisfactory.

Bhaugulpore Branch Agri-Horticultural Society

Pursuant to Resolution No. 6 of the Society's Proceedings, dated the 11th of April last, the first show of flowers, fruits and vegetables took place on the 10th of May 1843, at Cleveland House. The attendance of both European and Native gentlemen was most numerous; indeed the show room was quite crowded, and was honoured with the presence of the Ladies of the station.

The Floricultural department contained many rare specimens of the beauties of Flora, and the very healthy appearance of the flowers indicated the superiority of the Bhaugulpore climate even in the month of May. In the Fruit department, there were some very fine peaches, keeches, alloo-bokharas, plantains, &c. &c. Some of the peaches weighed 14 rupees each. In the Vegetable department, the most conspicuous specimen was a bundle of asparagus of unusual size, finer was never seen in Calcutta or even in England. It came from the garden of P. Onriat, Esq. Some new potatoes (from Madras seed) of very good size, from the garden of G. F. Brown, Esq. excited much attention, from the circumstance of the seed having been planted in February as an experiment and the fruit gathered in May, thus proving that two crops of potatoes can be raised in one year. A third crop is expected from seed planted in April, the plant being now healthy in appearance. Beet-root and celery from the garden of Major Napleton were next looked at. Both were of full size, and in the finest order. A basket of cucumbers from the garden of J. Glass, Esq. was remarkable for the size, colour and freshness of the fruit. Some carrots, (grown from English seed,) from the garden of Captain Don, were exceedingly fine, both in colour and size. There were some very fine leeks from the garden of J. Pontet, Esq. Several dillies from the gardens of Native gentlemen, contained some very good samples of vegetables and fruit, and from the improvements their gardens are undergoing, it is supposed the competition at our next show will be very great and exciting.

The prizes described in the appended list were accordingly awarded by the judges.

[This list is too long to be added to the report. It may, however, be mentioned, that prizes were awarded for the best samples of—parag—celery, beet root, onions, potatoes, love apples, cucumbers, carrots, American squash, for bee-bees, peaches, plantains, alloo bakharaj, for flowers, and for the best batch of guava raised from Cibool seed. These prizes were transferred to the possession of the successful competitors.]

A sample of clover reared from Cibool seed by Baboo Jooroo Churn Mitter looked very healthy, and had the blossom on it.

Since the last report of our proceedings, 12½ bighas of excellent ground (Lackaraj) in a beautiful situation, have been purchased, and much progress in fashioning and laying out the garden has been made.

A few flowers, raised by presentation to the Society, the names of the animal subscribers since the last report, and the names of contributors to the funds of the Society. The total number of subscribers is 17, and the amount of donations is 864.

The Society has determined on giving proper attention to the Agricultural department, and as the produce of the present harvest is very plentiful, both in the size and quantity of the grain, it is quite clear that an importation of good seed would prove highly beneficial to the district. Potatoes and garden seeds will be largely distributed, a change of seed of the former being much wanted. Prizes for cotton, sugar-cane, oats, wheat, barley, peas, and the like will be given in due season.

A cattle show for bullocks, cows, sheep, &c. the produce of the Bhāṅgūlpore and neighbouring districts is under consideration.

A public market is about to be established near the Botanical Garden, and it is believed that grain, vegetables, fruit, &c. will be brought for sale in large quantities. Thus the price of grain and other commodities will, it is hoped, soon become cheaper, and gradually descend to that reasonable price at which it was disposed of two years ago, when no great monopoly existed. This plan has been explained to several natives, and it is their opinion, that it will not only work well, but that we shall be able eventually to have two market days a week.

By order of the Society,

True Copy,

(Signed)

F. E. A. NARLETON

Secretary

Request for information relative to the Gums and Gum Resins procurable in India. By F. J. MOUAT, Esq. M. D.

TO JAMES HUME, Esq.

Honorary Secretary, Agricultural and Horticultural Society

SIR,—I shall feel much obliged if you can, through the medium of the Society, procure for me samples of the various Gums and Gum Resins found in different parts of India, as many of them are little known, and some may prove useful and valuable articles both for medicinal and commercial purposes. It would be well, if any member furnishing a specimen, could accompany it with the flower and fruit of the plant, with a view of identifying the real source of its production.

I have, &c

Calcutta, July 6, 1843

(Signed) F. J. MOUAT, Member.

[In giving publicity, through the medium of the Journal, to the above communication, the Committee of Papers take the opportunity of earnestly requesting the co-operation of the Members and Correspondents of the Society, resident in all parts of the Upper and Lower Provinces of India. If, in addition to the particulars mentioned by Dr. Mouat, some information were given regarding the place from whence the Gums are obtained, the trees which produce them, and the native modes of preparing them, it would not only add greatly to the obligation, but materially promote the object which the writer has in view.]

SUGGESTION FOR THE FORMATION OF A RAIL-ROAD FROM MIRZAPORE TO BOMBAY, THROUGH THE NERBUDDA VALLEY, AND FROM MIRZAPORE TO CALCUTTA

Extract of a letter from Lieut.-Colonel J. R. OUSLEY, dated Chota Nagpore, June 20, 1843

It is a source of much regret to me, to find a country of the nature of the Nerbudda valley, so neglected, in regard to roads. Fifteen or twenty years ago, a road from Jubulpoor to Mirzapoor was made. This is in excellent order, bridged throughout. I have already recom-

mended the continuation of this line through Hoshengabad, Hurda, Asseerghur, (Boorhanpoor,) in Khandeish, to Bomba, and with the finest coal fields in India, or probably the world, adjacent to inexhaustible iron mines. I see not why the road now made to Mirzapoor should not be converted into a rail-road, and the rest of the line continued as I advise, a few engineers and men from the great iron works in England or Wales alone are wanting, since charcoal, stone, water, coal and iron are all to be had at one spot, "Benor," near Chichelly. Surely the energies of our practical men could not be better employed than to apply those resources to making this superb work. The material the property of the Government, and the country through which the road would pass also, would reduce the cost of the road to one-twentieth what it is in Europe.

The country after ascending the Kuttra Ghaut, near Mirzapoor, until nearly Boorhanpoor is a level, and there is only one Ghaut on the Nassuck road, already finished from near Boorhanpoor to Bombay. The line from Mirzapoor to Calcutta is too well known to need being mentioned; all is feasible at small expense comparatively, and ultimately great gain must result in removal of produce, the cotton, wheat, sugar, bulky and immovable, would find their way down. Iron for all purposes. Coal for the steamers. Conveyance of passengers. Cheap and rapid relief of troops across the Peninsula, and every purpose to which it is now applied at home. Great part of the Post Office establishments would no longer be required, and there would be other savings. It is no further in advance of the present state of the country than our other scientific establishments, and no more beyond the means of the Government, than the construction of an ordinary road. But until by the instrumentality of railways, the productions of Central India are transported to the markets of Calcutta or Bombay, it cannot be expected that the extra qualities will have sufficient inducements for people to pay extra prices, although like Julaha wheat one-third better. This matter deserves to be prominently brought to the notice of the Government.

On the Transmission of Cuttings to India.

On the former occasion (p. 539, 1842), you published an account of the attempts which had been made to transmit cuttings of fruit-trees to India, when the partial success with some, and the complete success with others, was detailed.* It was then stated that almost all the cuttings of the Jargonelle Pear which had been sent to Bombay, and arrived in January, had rooted, and were very flourishing till the hot season came on. Bombay is 6000 miles from Falmouth, and is the first point of India which the cuttings reach, after leaving the steamer: having, however, made a short journey across the Desert, or from Cairo to Suez. The equability of temperature at sea being much greater than on land, the trial is much severer when seeds or cuttings have to be carried a long journey over the heated plains of a country like India.

In the former communication, it was also stated, on the authority of Dr. Falconer, that the cuttings of fruit-trees, especially of a Jargonelle Pear, Malo di Carlo Apple, &c., after making a further journey of 900 miles from Bombay to Saharanpore, had arrived there in a more or less vigorous state, and that when put into the ground, there was every prospect of the development of buds and of roots being effected. These cuttings had their ends dipped in sealing-wax, were rolled up in cotton, and afterwards wrapped up in an envelope of India-rubber cloth, the object being to retain the natural moisture of the cuttings, and to prevent their being dried up by the exposure to great heat.

So much success having attended this trial, it was determined to repeat the experiment at the favourable season, that is, in November last; when the cuttings are in a fit state to travel, and the temperature is lower than at any other time of the year, if we consider the time of their departure from this country, and that of their arrival in India. Some modification was made in the mode of packing. Instead of the ends being dipped in sealing-wax, the whole cutting was coated with bees'-wax, then wrapped in cotton, and afterwards enveloped in India rubber cloth.

* For this account, see page 326 of the first volume of this Journal.

The packets were made up at the India House on the 30th of October, and must have left Falmouth on the 1st of November. From Bombay, which the mail usually reaches in about 40 days, the cuttings had to be carried a land journey of about 1320 miles to the Botanic Garden at Calcutta, which they reached on the 30th of December. A letter from Mr. Griffith states, that three out of the five Apple-cuttings seemed quite fresh; of these, two were Golden Pippins, and one Duchesse d'Angoulême. The ground having been carefully prepared for their reception, and the season favourable, it was hoped they would succeed; but a postscript of the 15th of January states, that the Apple-cuttings remained in the same state, but that the seeds sent were almost all coming up beautifully. This experiment was made rather for the purpose of ascertaining how the mode of packing would answer than with the hope of the cuttings succeeding completely. But enough has been learnt for future trials with cuttings of trees better suited to the Calcutta climate.

By the same mail, a number of cuttings were sent to the Botanic Garden at Saharunpore: these arrived on the 28th of December. Dr. Jameson, who has taken charge of the Garden since Dr Falconer has been obliged to leave in consequence of ill-health, writes on the 20th of January the following report of the state they arrived in:—1, Duchesse d'Angoulême one specimen alive, the other dead, probably owing to the lateral twigs having been cut off and not sealed up. 2, Golden Pippin, with faint vitality, the pith discoloured, and the liber faintly green. 3, Glout Moreceau one dead, owing to the lateral branches having been cut off and not sealed, two alive, being devoid of them. 4, Malo di Carlo, in fine condition. 5, Gansel's Bergamot, upper end faint vitality; two specimens dead, the lateral twigs having been cut off and not sealed, three specimens in good condition. 6, Colmar, faint vitality upper end. 7, Jargonelle, eight specimens, all in good condition. "From the above statement it will be seen that this transmission may be considered a most successful one, and if cuttings void of lateral branches are sent, no doubt every one will arrive in good condition."

The success having been so considerable, and the additional experience, with the adoption of Mr. Beaton's suggestions (vide

Gardeners' Chronicle, vol. ii. p. 558), will no doubt enable future trials to be made with complete success.*

The cuttings sent to Bombay do not seem to have reached in such good order as last year, nor indeed so well as those sent at the same time to Calcutta and Seharanpore, the reasons for which do not appear; but great success has attended an attempt to send some seeds, which had not previously been found to travel well—that is, the Spanish Chesnut and Filbert: these in previous travels not only became decomposed, but destroyed every thing else that was contained in the same package. On the present occasion, the Chesnuts and Filberts were enveloped in a coat of bees'-wax, so as to be in fact hermetically sealed from the influence of the elements, and all at the same time to retain their natural moisture. It was intended to have enveloped the Chesnuts, &c. in a coating of gum, but the mucilage not being thick enough, ran off, and required some time to dry; bees'-wax is preferable. Respecting these, Dr. Gibson writes on 23d Jan. "The cuttings look dry, but I do not despair of them. Most of the Chesnuts were in good, and I hope vegetating, order; so also the Filberts, whereof I tasted one, and it had not the slightest smack of rancidity. As I fear trusting them to the dry Deccan air at this season of the year I have taken the precaution of putting them in pots before sending them up the Ghauts." If these vegetate, the success will hardly be less important than that with the cuttings, for we may not only send such seeds to India, but also obtain from thence others, such as the Acorn, which we now find so much difficulty in obtaining in a vegetative state —

J. F. R. — Gardener's Chronicle, April 8

Notes on the Botany of H. M. Discovery Ships, Erebus and Terror, in the Antarctic Voyage; with some account of the Tussac Grass of the Falkland Islands, by W. J. H

Since the days of the illustrious Cook, and of the distinguished men who accompanied that expedition, perhaps no voyage, undertaken for the purpose of scientific research, has ever excited so deep an interest in the public mind, or promised to yield such important results to navigation, and in the boundless fields of philosophical inquiry.

* These suggestions will be found at page 432 of the first volume of this Journal.

as that of Captain James Clark Ross, in the South Polar regions, in H.M.S. "EREBUS and TERROR." The nature of the service renders it imperative that the main body of the information collected, and discoveries brought to light during this protracted voyage, should not be generally divulged till the return of the expeditions, but through the medium of the *Admiralty*, the *Royal Society*, and the *Royal Geographical Society*, and the *British Association for the Advancement of Science*, and I may add of the daily Journals, several deeply interesting announcements have been already laid before the public, and it is now my agreeable task, with the sanction of the Admiralty, to make known to the botanical world some of the more important services rendered to that particular branch of science by the naturalists of this voyage.

What, it may be asked, can be expected in the way of Botany, in those dreary regions of the extreme south, where the rigour of the climate and the striking diminution of vegetation, in latitudes corresponding with those of the northern hemisphere, where vegetation is still copious, appear to offer an effectual barrier to the very existence of plants? Vegetable life is scanty, it is true, and the gallant commander of this expedition has pushed his researches into latitudes where every kind, even of aquatic vegetation, has ceased to exist, which is not the case in the north. There, far as human perseverance has penetrated, the same officer performing the enterprise, plants have never failed. But the object of the present voyage was not solely to prosecute investigations in the extreme South Polar Regions. Magnetic observations had to be taken, and astronomical instruments fixed, in various localities in the temperate and even tropical portions of our globe, and various islands and continents have thus been visited where Flora is arrayed in a great diversity of forms, and where the naturalists of the ships could not fail to carry on their pursuits with pleasure and advantage.

It is, nevertheless, in those islands of the southern hemisphere, which encircle the South Pole, at various and generally very remote distances, of which the Straits of Magelhaens and Kerguelen's Island may be considered the northern limit, that the productions, though comparatively few, are the most remarkable, and from their isolated position, and geographical distribution may be studied with such advantages as no other parts of the world can offer. And, happily, we know that this important branch of Natural History has particularly engaged the attention of the officers of the "Erebus and Terror," and the results cannot fail to be important to that branch of science in which Humboldt has led the way.

It is not our object, or wish, on the present occasion, to notice, in a detailed manner, any of the botanical novelties discovered in this voyage; but rather to satisfy the public mind, that in a department of Natural History, which could only hold a secondary place in the great undertaking, much may be expected to appear, of high interest, when the voyage shall have been completed.

The following observations are wholly derived from the information given by my son, Dr. J. D. Hooker, Assistant Surgeon in H.M.S. "Erebus," the officer on whom the botanical researches expressly devolved. It is not for a parent to say how well he has performed that task: but it were injustice to withhold the fact, that but for the friendly aid afforded by the other officers of the expedition, and by Capt. Ross in particular, the botanical collections, the copious drawings made from recent specimens, and the knowledge consequently acquired, would all be very limited, compared with what they actually are. A voyage of this kind is, in one respect, entirely different from inland travels, the scanty accommodation on board vessels of this description, where almost every inch of space is occupied by something connected with the chief objects of the expedition, being quite unlike what the naturalist meets with on shore; still, these difficulties have been, in a great measure, obviated by the kind consideration of the commander, who has granted every facility possible for the advancement of each individual department of science, by his own personal exertions, and the free use of his cabin. The collections which have already arrived bear ample testimony to the correctness of the statement.

We shall pass slightly over the countries whose vegetable productions are familiar to us, to dwell the longer on the more interesting and less known southern regions.

Her Majesty's Discovery Ships, "Erebus and Terror," quitted the Medway on the 25th of September 1839, and proceeded to Madeira. To the chief botanist this was a new country, and though the season was mid-winter, he found the gardens rich with *Bananas*, *Vines*, *Daturas*, *Fuchsias*, *China roses*, *Hibiscus* and *Heliotrope*, growing in the greatest luxuriance. A party was quickly formed to visit the well-known *Curral*, one of the most romantic spots in the island, about 3,500 feet above the level of the ocean, and where, at a favourable season, many good plants might be found; but now, in these elevated situations, little could be seen but a few *Mosses* and *Lichens*, with the withered remains of *Semperviva*, and other succulent genera.

The stay at Ténériffe, where the ships did not even cast anchor, was so brief as scarcely to allow of a dozen plants being gathered, besides

a few curious *Algae*. All was dried up and flowerless. From Ténériffe they shaped their course to the Cape de Verdes, and here, could some weeks have been devoted to the mountains, an extensive harvest might have been reaped. The several islands of this group present entirely different features. San Antonio is covered with wood. Sal, is a salt plain. Fogo, a stupendous active volcano, its reputed height 7000 feet. San Jago resembles a desert, with a fertile and mountainous interior, and as this was the only island touched at, and Porto Praya, its capital, being 12 miles from the rich central part, hardly any thing could here be accomplished in the way of botany. From the little that was seen of the island, the productions of its plain seem to resemble the vegetation of the great Sahara desert: of its valleys that of the tropics; while the mountains presented plants similar to what exist in the south of Europe, or the range of the Atlas. One hundred and ten species were secured in a good state, and about one hundred more were seen, but unworthy of being gathered. As the botany of the Cape de Verdes is little known, and supposed to be peculiarly interesting, it may be well to state the opinion entertained by one of the officers, after remaining some days upon the coast, as to the best mode of proceeding in a climate, which has the character of being extremely unhealthy. A temperate and judicious traveller, he observes, might, in two months diligent research, make a fine botanical collection in the country by proceeding to the hills immediately after the rainy season, where he could employ his time in perfect safety, if he protects his person with a light parasol, and avoids over-fatiguing himself. Porto Praya ought to be his landing-place, and thence he might proceed to the town of San Domingo. The inhabitants of the country-houses, chiefly Portuguese, are most hospitable; food is abundant, and ponies, though bad, are very cheap. "No idea, whatever, of the interior, can be possibly obtained by the coast scenery, nor, for many miles round Porto Praya; for there is hardly a tree to be seen; grass and herbage are totally withered and dry; the very stones black and scorching from the heat of the sun. The thermometer generally rose to 86° and even higher, in the shade; and during the whole day, while on our excursions, we found it impossible to obtain the means of allaying our thirst, except by applying to the poor negroes, (the population consisting of free negroes and a few Portuguese,) and they were invariably attentive and kind, offering oranges and Agua-ardiente, or assisting to extract the thorns and spines, that, piercing through the trousers and stockings, penetrated the flesh. Among the more interesting trees, a solitary *Baobab* (*Adansonia digitata*, see Botanical Magazine, Tab. 2791

and 2792) was observed; not more than 60 feet high; but with a trunk 38* feet in circumference.

From Porto Praya the direction of the vessels was easterly to the desolate rocks of St. Paul, lying a little north of the equator, and admirably described by Darwin; they are few in number, about 60 feet high, and constantly washed by a tremendous surf. One boat was sent on shore, and another was intended to be despatched the following day with the botanist, but the difficulty and danger of landing were found so great, that the captain wisely declined allowing the attempt to be made again. A *Sea-weed* inhabits the marine edge, but it does not appear that any plant, even a *Lichen*, is to be seen on the rocks themselves.

Still steering westward, there existed at one time, an idea of landing on the Brazilian coasts; but the course was then southerly till they made the little solitary island of Trinidad in S. lat. 20°. This exhibited small patches of vegetation on the weather-side, which is flat, while the lee is very rocky and steep; so that the only spot where a landing could be risked was a rock, cut off, unfortunately, from the rest of the island by inaccessible precipices. Nought but a *Fern* and a *Grass*, and one or two species of *Cyperus*, were to be obtained. Near the summit of the highest hills and under some cliffs, about 2000 feet high, were descried small groves of trees,—apparently, for it was impossible to judge correctly, *Tree-Ferns*, while all along the shore lay the remains of prostrate, barked, white trunks, no living ones being discernible even in such places, not even with the aid of the telescope. After an ineffectual endeavour, by landing at another point, to reach the higher portions of the island in search of this grove of trees, the great intervening distance and the ruggedness of the country compelled them to turn back, nor was it till the signal was given, that the party reluctantly went on board.* After a voyage, rendered very tedious by heaving against the trade winds, the expedition reached St. Helena on the 1st of February, 1840.

It must be a source of great regret to every botanist to know that this insulated rock, originally inhabited by a most peculiar vegetation, should have had its productions so completely changed by the destruction occasioned by cattle, and by the introduction of European and other plants, especially forest-trees, that these now take place of the native growth. On this subject, much valuable information will, no

* Adanson speaks of one in Senegal, which measured 30 feet in the diameter of its trunk, and which he estimated to be 100 thousand years old!—The oldest organic monument says Humboldt "of our planet."

doubt, be laid before the public. In the gardens of St. Helena there exists the strangest mixture of Tropical, European, and even Australian and Chinese vegetation, that can be conceived. *Acacias*, *Casuarinas*, *Pittospora*, *Billardieras*, *Dammaras*, from New Zealand, and *Eucalypts* from New Holland, flourish along with the *Scotch Fir*, *Plane*, *Peach*, *Apple*, *Pear*, and *Plum*; and there are *Sudamnea* from the East-Indies, and *Aroideæ*, with *Pine-Apples*, *Roses*, *Hydrangeas*, *Camellias* and *Tea-plants*. An excursion to Diana's Peak, and other places, with diligent search on the way, afforded the means of making a tolerable collection of such native vegetation as yet lingers on the islands.

On their way to the Cape, and within a few miles of it, the ships fell in with great masses of floating seaweed, all of one kind, a *Laminaria* (*L. buccinulis*?) which had been torn up through the action of some great submarine force; and in several instances they counted, proceeding from one branching root, 6 great stems, the longest of which measured 21 feet, erect, smooth, and rather club-shaped, broadest above and fistulose; while from the summit of this again sprung the palmated blade or lamina, adding 6.8 feet to the whole length. The quantity of parasitic and marine animals found among this seaweed was quite extraordinary, and added greatly to the collections. One plant alone afforded 4 parasitic *Alga*, and 30 animals of different kinds.

The near approach to the Cape of Good Hope called up feelings in the mind of the young naturalist, which are best expressed in his own words, and can be only understood by one who possesses a keen relish for the wonders and beauties of Nature, and takes a pleasure in imparting to others a share of the knowledge and of the objects which he has himself attained by long and distant travel. The productions of the Cape were, however, not wholly unknown to the writer for the frequent botanical communications of one dear and valued friend,* the discover of *Wardia* and other South African novelties, had rendered him familiar with many of the vegetable productions of the colony, and, as it were familiarized him with the localities where they grow. "I have heard Naturalists," says our botanist, "complain of the tedium which attaches to a sea-voyage, but such persons cannot be true naturalists, or must be suffering from sea-sickness, a cause from which I have never suffered for an hour. I do not mean to say that I should not have been better employed and happier if studying botany at home,

* The Hon. W. H. Harvey, late Colonial Treasurer at the Cape of Good Hope, but at this time absent on account of ill health.

but I assure you, that my weeks fly away fast; though, from my being a slow worker, I have not much to show; and unaccountable as it may appear to you, when we draw near shore, I feel quite thrown out of my usual routine of occupation. I will own, however, that once my foot has touched *terra firma*, there is a sort of magic connected with it, that makes me grievously loth to quit it for sea again. There are those peculiar emotions consequent on visiting new countries for the first time, which are perfectly indescribable. I never felt as I did when drawing near Madeira, and probably never shall again. Every knot that the ship approached, seemed to call up new objects of inquiry, and it still is the same with each new land and even barren rock. So it was when we made the Cape. On descrying Table Mountain, I could have sat (and did sit) for hours, wondering whether this knoll was covered with *Heaths* or *Rutacea*; if that rill produced the *Wardia*, or such a rock the *Andraea*; where were Ludwigsberg and Wynberg, the *Tree Ferns*, and all those objects which the mind associated with our mutual pursuits and friends at home. No idea recurs so often, or is so delightfully pursued, as that of telling my relations of all that I have seen: never do I view a new prospect but I think what pleasure it will give to scan it o'er again, as it were, in their society; mapping out the spots where my specimens have been gathered, painting the scenery to one, and spinning to another the yarns of incidents that have befallen during my excursions, while my untravelled friends will look upon me as 'the monkey that has seen the world.'

The botany of the Cape itself and of Table Mountain, which was the utmost extent of the young officer's rambles, is too well known to render it necessary to dwell upon the subject here, and we are approaching a country, of scanty vegetation, indeed, but replete with interest to the philosophical inquirer, from its size, 200 leagues in circuit, its position, (N. lat. 49° 20' E. long. 69° 30') so widely severed from other lands, and its most peculiar, though limited Flora, namely, Kerguelen's Island, or Desolation Island. We are not aware that any thing was previously known of its vegetable productions, save what is said respecting them in Captain Cook's third voyage, where it is observed, "Mr. Anderson, my surgeon, who had studied Natural History, lost no opportunity, during the short time we lay at Christmas Harbour, of searching the country in every direction. I insert his observations in his own words.---'Perhaps no place hitherto discovered in either hemisphere, under the same parallel of latitude, affords so scanty a field for the naturalist as this barren spot. The verdure appears when at a little distance from the shore, as if it would promise some

herbage, but in this we were deceived. For, on landing we found that this lively colour was occasioned only by one small plant, not much unlike a *Saxifrage*, which grows in spreading tufts to a considerable height up the hills. It forms a surface of a pretty large texture, and grows on a kind of rotten turf, into which one sinks a foot or two at every step. This turf, dried, might, in case of necessity, serve for fuel, and is the only thing we met with here which could possibly be applied to this use.

“ There is another plant, plentifully scattered about the boggy declivities, it grows to near the height of 2 feet, and resembles a small cabbage when it has shot into seed. The leaves about the root are numerous, large, and rounded, narrowest at the base, and ending in a small point. Those on the stems are much smaller, oblong, and pointed. The stalks, of 3 or 4, all spring separately from the root, and run into long cylindrical heads, composed of small flowers. This plant has not only the appearance, but the watery acrid taste of the antiscorbutic plants, yet differing so materially from that whole tribe, that we regarded it as a production entirely peculiar to the place. We ate it frequently raw, and found it almost like the *New Zealand Scurrey-grass*. But it seemed to acquire a rank flavour by being boiled, which, however, some of our people did not perceive, and esteemed it good. If it could be introduced into our kitchen-gardens, it would probably so improve by cultivation as to become an excellent herb. At this time none of its seeds were ripe enough to be gathered and brought home to try the experiment. Two other small plants were found near the brooks and boggy places, and eaten as salad, the one almost like *garden-cress*, and very fiery, the other quite mild. This last, though small, is in itself a curiosity; having not only male and female, but what the botanists call *androgynous* plants.

“ A coarse *grass*, which we cut down for the cattle, grows pretty plentifully in a few small spots about the sides of the harbour, with a small sort, which is rarer, and upon the flat ground a sort of *goose-grass*, and another small production much like it. In short, the whole catalogue of species does not exceed sixteen or eighteen, including some *Mosses* and a beautiful *lichen*, which inhabits the rocks higher up than any other, nor is there the least approach to a *shrub* in the whole country.”

But to return to our voyagers. The “ *Erebus* and *Terror*,” having quitted the Cape of Good Hope on the 6th of April, 1840, spent from the 12th to the 17th of that month in crossing the *Agulhas Bank*, which afforded ample scientific occupation, in its immense masses of *Macro-*

cystis pyrifera,* (that enormous seaweed, supposed to be the longest vegetable production in the world, Sir Joseph Banks having judged that, in the Great Pacific Ocean, it attains an extent of 1,500 yards) and in the great variety of marine animals which this *Alga* harbored. On the 21st they passed to the southward of Marion Island, formed of flat terraces of volcanic rock, with high, cone-shaped, often red mountains, towering to a considerable elevation. Colonies of Penguins were on all the shores. The "Erebus" was hove to, with the intention of landing next morning, and they began dredging in 69 fathoms, between Marion and Prince Edward's Islands † The dredge came up, filled with white coral and thirty-seven distinct species of marine animals. Next morning, however, the voyagers found themselves driven so far to leeward of the island, that it would have required too long a time to beat back; thus landing was rendered impracticable. Early on the 26th, after encountering some very severe weather, the westernmost of the Crozet group was described, and on the first of May they hove to at Possession Island, but the wind was too strong (it must be remembered that the season was mid-winter in these latitudes) to allow of the attempt being made without danger of the ships being blown off, and having to beat up again, which must have occasioned many days' delay. The Island, indeed, seemed perfectly barren of aught but a few coarse tufts of grass, and a moss-like substance that clothed the rocks and vallies—all was volcanic. ■

On the 6th of May, the long-wished-for Island of Desolation, or Kerguelen's Island, was descried, and the ships first made Bligh's Cap to the westward of it; but the weather became so thick that it was necessary to keep off from the direction of the land, for evening was approaching. On the 8th, they were blown eighteen miles to leeward of Christmas Harbour, but before night, they retraced their way, and hove-to off the mouth; when again, heavy gales coming on drifted them in two days, one hundred and fifty miles from the desired haven, and the 12th of May arrived ere they found themselves at anchor in the outer

* This gigantic seaweed is found throughout the Great Pacific Ocean, and in the Atlantic from the equator to the 45th degree south latitude—but its length may perhaps be greatly over-estimated, judging by an observation made by M. Gauchaud, the botanist to Freycinet's voyage. He says, that "when near Cape Horn and the Falkland Islands, the ships steered through wide banks of *Macrocystis pyrifera*. Two-thirds of each plant, obeying the law of specific gravity, floated in a perpendicular position, not however attached to the bottom of the ocean—and this upright position has perhaps induced the belief that the extraordinary seaweed in question grew at an immeasurable distance from the surface."

† In the excellent Admiralty Chart of the South Pole all the places here mentioned may be seen accurately laid down, together with the tracks of H. M. Discovery Ships in 1841, and 42, till their arrival at the Falklands.

bay of this singular harbour, whence they had to warp up the head of it. A faithful representation of one side of the scene around them, which was most remarkable, is given in Cook's third voyage. The outer basin is about two miles in diameter, bounded by lofty cliffs of black rocks, from which the land rises in successive ledges, till it terminates in table-topped or peaked mountains, 1,500 to 2,000 feet high; and the effect of this was the more remarkable, from the nearly equal distribution of rocks, snow, and vegetation. "Often as I have sat," says the botanist, "on the summit of the cliffs which hem in this unbound bay, it was impossible to grow tired of watching the fearful surf, continually roaring and lashing against a mile of precipices, surmounted by high, snow-capped mountains. Whenever a gale blows from the south-west, which is continually the case at this season of the year, the wind is concentrated by the hills of this bay, and carried with redoubled violence into Christmas Harbour, where it spends its terrific fury, rendering all our anchors and cables barely available for securing the ship, and sometimes forbidding, for many days, any communication with the shore.

"The first plants to be seen, on landing, are, of course, *Sea-weed* and *Lichens* on all the rocks; then come a long *Grass*, an *Agrostis*, a little *Ranunculus*, and more abundantly than either, a *Composite* plant, forming small turfy slopes and ledges, of a bright green hue, among a mass of black bog-earth, covered with a *Calitriche* and *Portulacous* plant. Conspicuous amongst all these, is "the CABBAGE," throwing out its thick round roots, 1-2 inches diameter, and exposed from a few inches to 2 or 3 feet, along the ground, bearing at its extremity, large cabbages, sometimes 15 inches across, of obconical or spatulate, rounded, concave, green coriaceous leaves, enfolding a white heart, which eats like coarse, tough mustard and cress. From the sides of the heads, issue one, or more, long leafy stems, bearing such spikes of seed-vessels as my specimens, sent to the Admiralty, will shew. The root tastes like *Horseradish*, the seeds like those of *Cress*; but the leaves are the grand fresh provisions, and were so extremely relished by the sailors, that during the whole of our sojourn in that barren land, they were always boiled with the ship's company's beef, pork, or pea-soup. They taste to me very like very stale cabbage, with a most disagreeable essential oil which resides in cavities in the parenchyme of the leaves, and which are very conspicuous on making a transverse section of the heads of leaves. This oil gives to this vegetable a curious anti-heartburn property. Altogether, I consider this cabbage a most invaluable antiscorbutic, which few persons do not like, or cannot bring themselves to

cat. Near the sea it grows in great abundance, and ascends to the tops of the hills, 1,500 feet high, where it is small and hairy, but retains all its properties.

"The next most remarkable plant is a little tufted *Umbelliferous* one. It forms long brown patches on the shores, the banks and rocks, sometimes covering many acres of land with deep cushions, on which you may, from their elasticity, lie with comfort, though, at other times, you sink up to the middle. The tap-roots of old tufts strike many feet into the soil which its own self has formed (owing to its property of shooting annually upwards) from the withered tops of the previous years' shoots, like *Bryum Ludwigi*. The flowers are scarce and very inconspicuous. It has no smell, nor any essential or other oil; but is remarkable as one of a group of *Umbelliferae*, peculiar, I believe, to the southern hemisphere, and there only found in exceedingly alpine or antarctic regions.*

A *Acana* is the next plant of frequent occurrence, growing in bogs or creeping over the dried soil, like *Comarum* at home, of which it put me much in mind. All the above-mentioned species are nearly confined to the vicinity of the sea, the *Cabbage* and *Haloragaceous* species alone being found at any height above its level, and all are frequently exposed to the salt surf, apparently with impunity.

"At an elevation of about 300 feet above the sea, and also near it, I observed a small tufted *Silene* (?), two *Grasses*, one of them a little *Poa*, and the other a most beautiful (*Ara*?), with remote horizontal spikelets, on long peduncles, the latter is rather scarce, and certainly is the most delicate and pretty plant on the island, it grows in marshy places. On the banks of two small lakes, between Christmas Harbour and North-west Bay, a little *Juncus* occurs, and in the lakes a most remarkable plant, which resembles *Subularia aquatica*, forming green patches a foot or two feet beneath the surface of the water, on a loose muddy bottom. There it flowers; the close imbrication of the calycine segments and those of the corolla, protecting its stamens from the influence of the fluid. Each germen contains a small bubble of air, generated, of course, within the ovary. Winter seems to be its season of inflorescence, for I found it in blossom, after a long search, under a coating, two inches thick, of ice. So far as I have hitherto examined this plant, it seems to differ in character from any Natural Order; though, like *Limosella*, it may be nearly allied to *Scrophularinae*, having also some of the peculiarities of *Lentibularinae* and *Primulaceae*.

* The plant here alluded to is probably a *Bolax*, and allied to, though different from the remarkable "*Bolax Bog*," *Bolax gleharia*, of the Falkland Islands. — Ed.

" The seasons are evidently late on this island, and the winter comparatively mild. We have had frequent hail and snow storms, but these seldom lasted more than a few hours on the low ground, the sun, wind, and rain soon removing the snow, with apparently slight injury to vegetation. There was but one strictly aquatic plant, and one entirely confined to dry land, all the rest, so far as I could discover, preferring a moist and peaty soil. Of *Juncus maritimus* and Mosses there was a considerable number of species, all belonging to alpine or arctic forms: especially the genus *Andraea*, and another, approaching *Sesleria* in characters. The *Lichens* appear to form a much larger component part of the vegetation at Kerguelen's Island than is the case, comparatively, in other parts of the world, especially when it is remembered that, from the absence of trees, there can be no parasitic species. The rocks from the water's edge to the summit of the hills are apparently painted with them: their fronds, in general, adhering so closely to the stones, that it is only with difficulty they can be detached, in other cases, they seem to form part of the rock, which, from its excessive toughness and hardness, almost defies any attempt to procure such specimens as shall be at all satisfactory. At the tops of the hills they assume the appearance of miniature forests on the black rock, and nothing can be prettier than the large species, with broad black *Sporophylls*, which covers all the stones at an elevation of from 1,000 to 1,500 feet. A smaller kind, like a little oak-tree, grows spreading tufts (also upon stones), and is of a delicate lilac colour. Near the sea, the plants of this tribe are generally more coriaceous, especially a yellow one that there forms bright patches on the cliffs. In the caves, also, on the coast, a light red species is so abundant as to tinge such situations with that hue, and many other sorts inhabit the rocks and their crevices.

" Sea-weeds are in enormous profusion: especially two large species, the *Macrocystis pyrifera* and *Laminaria radiata* (?). The former forms a broad green belt to the whole island (so far as seen,) of 20 or 30 yards, within 20 feet or so from the shore. Here the branches are so entangled, that it is sometimes impossible to pull a boat through the mass, and should any accident occur outside this girdle of sea-weed, its presence would form an insurmountable obstacle to the best swimmer's ever reaching land. On the beach, the effect of the surf, beating it up and down, affords a very pretty appearance, but not so striking as is the view, from a slight elevation, of the Bay, with this olive-green band running round it. The sea-birds, when on the water, always fly over or dive under it, to re-appear on the other side. The *Laminaria* hangs down from every rock within reach of the tide; its digitate fronds, of

a very thick coriaceous consistence and of great weight, are perpetually in movement from the lashing of the surf, and yet, thanks to their sliminess and strength, always uninjured. It protects thousands of *Limpets*, that would otherwise be exposed to the attacks of the gulls and other sea-birds. To collect our food of *Petalia* was often hard labour, as we had to remove the tough and heavy masses of this weed to get at them."

Such were the first impressions, made upon the botanists, by the vegetation of Kerguelen's Island, which a two and a half month's stay gave pretty good opportunities of investigating; and the specimens sent home to the Admiralty testify that the time was not idly spent. That it should have been practicable to have gathered them, with flower and fruit in the very middle of winter, shews a great peculiarity in the climate. The latitude of this island, in the Southern Hemisphere, is as nearly as possible the same as that of our Channel Islands in the Northern; and these though far more limited in extent, produce, as stated by Mr. Babington, about eight hundred and forty species of *phanogamous* plants: whereas, in Kerguelen's Island, though the Flora was doubled by the researches of the "Brebus and Ferror," the number of species does not exceed thirty-two, while the proportion of *Cryptogamic* plants is very great, from which circumstance a very rigorous climate might be inferred. Such is not however, the case: the winters, though stormy are not so severe as to destroy the power of vegetation, or even materially to retard inflorescence. The paucity of plants must be accounted for from other causes.

We have reason to know that a peculiarity of soil, climate, volcanic action, &c., of this remarkable spot, affecting its vegetable productions, are fully discussed in the journal of the botanist of this expedition, and some highly interesting results are deduced. We have no desire to anticipate that information, but are unwilling to withhold the following remarkable fact. "Cook visited this island in December, the very height of summer, when he met with only eighteen species of plants (as before stated) including *Cryptogamia*—of these he mentions five flowering plants in blossom. Of these five, I have, in May gathered three, abundantly in flower, and two others, the *Cabbage*, and, I suppose, the *Callitriche* plant, just running into seed. Of these five again, two remained in bloom till July 20th,* and none but the *Cabbage* had, till that time, fully shed its seed. Hence it would appear that few of the vegetables had performed their most important function, before the middle of winter." Winter botanizing in these antarctic regions, is, however, no sinecure, as the following extract will shew.

During my stay at Kerguelen's Island, I devoted all my time to collect every thing in the botanical way. The Captain kindly took off all restriction, permitting me to go on shore whenever I liked. My rambles were generally solitary, through the wildest country I ever beheld. The hills were always covered with frozen snow, and many of my best *Lichens* and *Mosses* were obtained by hammering at the icy tuffs, or sitting on them till they thawed. The days were so short, and the country so high, snowy and barren, that I never could go to any great distance from the harbour, though I several times tried for it, by starting before daylight. As far as I proceeded, the vegetation did not differ from that of the Bays. A boating excursion was undertaken to explore to the southward of the Island. I volunteered to accompany it, but was advised to wait for a second, and my superior officer, the surgeon, went. The party returned after some days, without having accomplished anything; the officer who led them found it impracticable for loaded men to travel by land, over rocks, round bays, and through snow-drift, and when they took to the boat, the furious gales almost drove them out to sea. I went several boating excursions, and on one was dismasted and nearly swamped, so Capt. Ross would allow no more to be sent. Two *Lycopodia*, (one, a splendid species,) and a *Fern* were on this occasion added by Mr. McCormick to my collection.

Coal and fossil-wood also abound in this most singular country: the latter was found lying in immense trunks, bedded in the solid basaltic rock.

The botanical productions of this large island may be thus summed up. There were gathered in all, about one hundred and thirty plants, and in the following proportion:—One *Fungus*, one *Chara*, thirty-eight species of *Alga*, and thirty of *Lichens*, ten of *Confervee*, one *Marchantia*, and ten *Jungermannia*, twenty-three *Mosses*, two *Lycopodia*, and a single *Fern*, five *Grasses*, and one *Juncus*.—One species in each of the following Natural Orders,—*Amaranthaceæ*, *Cruciferae*, *Ranunculaceæ*, *Compositæ*, *Portulacææ*, *Rubiaceæ*, *Haloragaceæ*, *Umbelliferae*, *Rosaceæ* and *Caryophyllææ*. Of two plants it was not possible to define the affinities.

I did my best to collect every thing that Kerguelen's Island afforded, not neglecting the most insignificant plant, often walking on the beach gathering sea-weeds, my feet in the water, and wet to the skin with the dashing surf, I left not a hole unsearched, or stone unturned, and on those days when violent gales and snow-storms forbade all communication with the shore, I spent my time, and happily, too, in drawing, making analyses, and describing the specimens which I had brought on board. There is some danger, however, that inaccuracies may have

crept into my work, for the rolling of the ship often obliged me to hold on, while thus employed, and to have my microscope lashed to the table, which renders dissection, under the glass, peculiarly difficult."

A *Ward's case*,* was brought away, filled with all the plants that could be found, all dug up and packed by the same active pair of hands as made the above mentioned drawings and descriptions. The Captain had kindly harboured this box in his cabin during the continual foul weather, but unfortunately, just before reaching the next port, (Hobarton, Van Dieman's Island,) a fine day induced him to set the plants on deck, when a sudden tempest ensued, which not only blew the ships off the land, but did the valued case considerable damage.

Van Dieman's Island, from its vast extent, presents a wide field for the naturalist, and though Labillardiere, Brown and Cunningham have laboured there, an ample share yet remains for future investigators. But as our object is mainly with Antarctic vegetation, we shall merely observe that what with the collections of the "*Erebus* and *Terror*," and those made by the unwearied exertions of Ronald Gunn, Esq., during many years, and placed at our disposal, there exist in this country ample materials for a Flora of that most interesting colony, such we trust as will form a part of the publication of this extended scientific voyage.

Dreadful weather, had, however, to be endured, between the 30th of July, when the ships quitted Kerguelen's Island, and the 16th of August, when the river Derwent received them. They had ran a thousand miles a week for three successive weeks, and were just in sight of Van Dieman's Island, when that gale, which did so much injury to the plants in the *Ward's case*, came on and drove them out to sea again, carrying one poor fellow overboard, and often sweeping the decks fore and aft. Happily the "*Erebus*" proved herself a most admirable sea-boat, riding

* The dreadful weather which the ships encountered in the inhospitable Antarctic Region, was highly unfavourable to the preservation of living plants, which it has been most anxious to collect. The Commander intended to send to the Royal Botanic Garden of Kew. With difficulty, "*Crucifera* and *Lupinus*" was kept alive till the expedition reached Van Dieman's Island, when it was prudent to plant in the Governor's garden, and soon sprouted. Seeds were transmitted to England, but though treated with the greatest care, and tried in various places, they showed no symptoms of germinating, though they looked good to the eye. But as they were heated in passing through the Tropics, for other seeds carried on by the officers, and kept for twelve months, vegetated* in being set at the Falkland Islands, but again, then growing, yet did not survive the voyage to England. There is no plant that would have given us the opportunity to have introduced to our Gardens, for the cultivation there is reason to believe it will prove a valuable element. Farther, it belongs to a perfectly new genus of *Crucifera*, which Mr. Anderson, the Surgeon, and Botanist in Capt. Cook's third voyage, designed according to his *MS.* deposited in the British Museum, to have dedicated to Sir John Pringle, President of the Royal Society, and an eminent physician of the day.

like a bird on the waves, and when struck and washed by the great seas that broke over her, only staggering a little, till a port was knocked out, by which the immense body of water was suffered to escape.

Nearly three months were spent in Van Dieman's Island, and on the 12th November 1840, the "*Erebus* and *Terror*" sailed down the Derwent, on their way to the extreme southern regions of our globe, amidst the enthusiastic cheers of the people of Hobarton, and accompanied for 30 miles by his Excellency Sir John Franklin, of whom it need hardly be said that he has taken the deepest interest in the success of the voyage, and, assisted by the inhabitants generally, rendered our countrymen's stay in that colony peculiarly agreeable. On this memorable cruise, one of the grand objects of the expedition was fully accomplished, that of ascertaining the precise bearing of the South Magnetic Pole, and though it could not be supposed that such a voyage should be rich in vegetable productions, and although these were almost wholly derived from two islands; yet, their character is highly interesting. Our bold voyagers penetrated as far as 75° S. latitude, 7 degrees farther than Capt. Cook was able to accomplish, nearly 4 degrees beyond the no less enterprising Weddell, they discovered, and ran along a vast extent of new continent, covered with everlasting snow, yet presenting to the view mountains of vast magnitude, from 9 to 12,000 feet in elevation, and one of them an active volcano.

On the 20th of November, eight days after quitting the Derwent and in S. lat. 51° long. 166°, the ships reached Lord Auckland's Islands, where they remained till the 12th of December. This gave ample time for botanical investigations, and the opportunity was not wasted. About one hundred and twenty species of plants were added to the Herbarium (exclusive of *Algae*;) and most copious notes and drawings were made from the recent specimens, together with minute observations on their distribution according to altitude, &c. Some remarkable genera now grow at Lord Auckland's Islands, and two *Ferns*, which, from their caulescent stems, though they are small compared with the tropical *Tree-ferns*, may almost be called arborescent. Among the *Mosses*, are three undescribed species of *Andrea*, a fine *Conostomum*, *Bartramia*, two *Hookeria*, &c. A bird's eye view of the principal island presents about equal distribution of wood, shrub and pasture land; but with the mountains nowhere rising to such a height as to be destitute of grass to their very summits.

On landing, what may be considered the maritime zone, extending from the beach to the border of the woods, a very narrow belt, afforded *Ranunculus*, *Cardamine*, *Stellaria*, two *Acaea*, *Portulaca*, *Lobeliacea*, *Calli-*

trichea, *Bulliarda* ? and three *Compositæ*, two of which are also found on the hill-tops, *Gentiana*, *Myosotis*, *Polygonæa*, *Veronica*, *Plantago*, *Amaranthacea*, *Poa*, *Urtica*, *Pteris*, *Stegania*, and two *Orthotricha*. The woody zone almost immediately commences and contains *Myrtaceæ*, *Araliaceæ*, *Coprosma*, *Ozothamnus*, *Epacrideæ*, *Veronica*, two *Orchideæ*, *Carex*, and a nearly allied genus, two *Aspidia* with an arborescent caudex, two *Asplina*, *Grammitis*, *Polypodium*, with many *Mosses* and *Jungermanniæ*, occupying the trunks of trees, and coating the earth in dense tufts, insinuating themselves into every vacant space and crevice, and in their decay, together with the fallen foliage of *dicotyledonous* plants, forming a rich damp vegetable humus. It is hard to say, in this zone, whether the trunks of trees, the *Ferns*, or the plants of the lower Orders, occupy the greatest space in the forest. The most arborescent kinds are the *Veronica*, the *Araliaceous* plant, the *Myrtaceous* and the *Epacrideous*, and these are often so dense as to exclude the sun's rays from the ground. The predominance of *Ferns* extends for about 300 yards from the beach.

Next to the trees comes a shrubby belt, not indeed clearly defined, for it contains many of the trees of the lower region, (the arborescent *Veronica*, however, wholly excluded) though in stunted forms, mixed with a curious *Schizæa*, the *Coprosma* of the higher levels, a large *Lycopodium*, a blue-flowered *Veronica*, &c. This bushy region contains vacant spaces of black, almost naked earth, in which are imbedded the dead roots of existing species of trees. Why the soil in such situations should remain thus bare, is not easily to be accounted for, but their appearance is highly peculiar, being often spotted by a white *Lichen*, and occasionally exhibiting plants which are either peculiar to it, or very scarce elsewhere, as *Gentiana*, the *Schizæa*, above-mentioned, *Astelia*, *Drosera*, an *Epacrideous* shrub like *Empetrum*, and a plant of *Stylidium*.

The upland or subalpine district then follows, consisting of an open space, chiefly clothed with a species of *Bromus*, a *Hierochlor*, and in some spots two *Umbelliferous* plants in dense patches, an *Araliaceous* one, a *Ranunculus*, some *Compositæ*; but no bog-plants like *Sphagnum*, *Juncus*, *Drosera*, (of which the solitary specimen discovered was unfortunately lost,) *Stylidia*, *Chelanthæ*, *Lichens* and other plants, while the few woody species are wholly concealed in the glens.

Above this again comes the *Alpine region*, wholly confined to the summits of the hills. No other is equally distinctly marked as to botanical limits, probably owing to the existence of several long low ledges of rocks, which are *basaltic*, and some of them columnar, and which produce a peculiar vegetation, partly indeed subalpine, but the follow-

ing plants do not appear to descend below them, except indeed the two *Compositæ* above-mentioned, which, like the *Thrift* and *Rose-root* of Europe, seem to be both alpine and maritime. *Ranunculus* two species, *Cardamine*, *Acarna*, *Geranium* (?) *Potentilla*, *Araliaceæ*, *Gentiana*, *Plantago*, four *Compositæ*, *Epilobium*, two *Junci*. *Hieracium*, *Agrostis*, *Lycopodium*, *Andraea*, *Dedymodon*, *Conostomum*, *Bartramia*, *Bryum*, *Polytrichum*, with many other *Mosses* and some *Lichens*. In Lord Auckland's Islands, an *Asphodelous* plant is very abundant, holding the place of *Nathecium* in our northern hemisphere, it grows from the seashore to an elevation of 800 feet above the level of the sea, and is extremely handsome, forming a conspicuous feature in the landscape from its great profusion, which is indeed so remarkable in some places, that at the distance of a quarter of a mile, the ground seems spangled with gold through its yellow blossoms. These, moreover, exhale a slight but agreeable fragrance. Three species of *Veronica*, are also showy, especially the maritime one, owing to the abundance of its flowers, which make the tree look as if powdered. The blue of the alpine species, is very intense, and sometimes is a bright blue azure. The *Sea-side Gentian* is as lovely a plant as can be imagined, with most delicate inflorescence and foliage that has a waxy appearance. Two of the *Compositæ* were among the handsomest productions of the island. Notwithstanding, however, the beauty of these and some others, the general aspect of the vegetation is sombre and of a much browner tint than even in Van Diemen's Island. The prevalence of the *Myrtaceous* plant gives a lurid hue to the landscape. Of the fine *Dracophyllum* only the younger leaves are green, the older ones turn red and brown, and then drop off in immense numbers, so that on penetrating the woods they are gloomy in the extreme, from the prevalence of fallen foliage, and the general absence of the sun's cheerful rays. Few of the plants are fragrant; the *Asphodelous* plant above-mentioned is, also the white-flowered *Veronica*, whose scent resembles that of our *Jasmine*, while the alpine *Hieracium*, like the species of our northern hemisphere, diffuses a most delicious odour. Of fetid plants there are not a few, among such the *Ceprosias* stand pre-eminent; the *Araliaceæ* too are disagreeable, and so are the *Gentianas*, when drying.

After quitting Lord Auckland's Islands, the expedition visited Campbell's Island, in S. lat. 52½, and anchored in the South Harbor. Here they remained only three days, but made the best use of their time in collecting the vegetable productions, which, as may be inferred from the geographical position, are in many respects, similar to what prevail in the group they had left. Campbell's Island is however,

much smaller and very rugged, its mountains attaining a height of 1,200 feet; yet some additional species were gathered, especially *Mosses*. The two caulescent *Ferns*, are abundant here also. "The valleys were, unfortunately," writes the botanist, "completely devastated down each side of South Harbor, where we lay, by fires that had been kindled by the sailors. The windward side of the Island presents many anomalies. In particular, it may be mentioned that, probably owing to the heavy south-west gales, it is totally devoid of every thing approaching to a shrub, and many plants which, on ascending the leeward side of the island, are only seen on arriving at the summits, here descend to within a hundred feet of the sea: such as the little *Boraginaceous* plant (*Myosotis*?). several grasses, &c. thus the two sides of the island exhibit very different distributions, from local circumstances."

On leaving Campbell's Island, 17th December, the Expedition bade farewell to terrestrial vegetation; and, when about the parallel of Emerald Island in 57° , but at some distance from it, they passed some *Sea-weed*, this proved the last trace of vegetation of any kind that was seen. On the 28th, in lat. $62^{\circ} 40'$, the first of the icebergs came in sight, and henceforth these were their constant companions, and on the 2d of January, 1841, they procured a piece of rock from off one of them. The latitude of Captain Cook's farthest south was passed on the 11th, and at 2 P. M., the navigators caught the first glimpse of an immense range of snow-capped mountains to the southward. On the 12th, in lat. $71^{\circ} 49'$, long. $170^{\circ} 52'$, they landed for a few minutes, on an island off the coast, all snow, with no trace whatever of vegetation. It cannot even be stated that the remarkable substance, *Red snow*, so common in high northern latitudes, as also in South America, and respecting the animal or vegetable structure of which, naturalists are as much in doubt as ever, exists in the extreme southern regions. On the 24th, having attained lat. $74^{\circ} 23'$ long. $175^{\circ} 51'$ they beat Weddell, the individual who had reached a higher southern position than any other, and on the 27th, in lat. $75^{\circ} 47'$, and long. $168^{\circ} 58'$, they effected a landing, with the utmost difficulty, on a little island, entirely clad with snow, save on the perpendicular cliffs where it cannot lie. The coast was lined with ice, but interspersed with fallen masses of stone, rocks, and sand, and it was impossible to advance a yard into the interior; but as far as eye could reach and glasses could range, not a particle of vegetation existed.

It was on the following day, January 28th, in lat. $76^{\circ} 57'$, long. $169^{\circ} 25'$, that our countrymen first descried that active volcano, which could not fail to form a spectacle the most stupendous and imposing that can

be imagined; whether considered in regard to its position, 77½ S. lat., or in reference to the fact that no human eye had ever gazed upon it before, or to its elevation of 12,500 feet above the level of the sea. What increased the wonder is, that it is but one of a stupendous chain of mountains, a portion of a new continent, of vast but undefined extent, the whole mass, from its highest point to the ocean's edge, covered with everlasting snow and ice; the sun (at that season) never setting, but day and night exhibiting the same spectacle of the extremes of nature's heat and cold. In mentioning such a phenomenon, I may be allowed to make the following extract from my son's letter — "The water and the sky were both as blue, or rather more intensely blue than I have ever seen them in the tropics, and all the coast one mass of dazzlingly beautiful peaks of snow, which, when the sun approached the horizon, reflected the most brilliant tints of golden, yellow and scarlet; and then to see the dark cloud of smoke, tinged with flame, rising from the volcano in a perfect unbroken column; one side jet-black, the other giving back the colours of the sun, sometimes turning off at a right angle by some current of wind, and stretching many miles to leeward." This was a sight, so surpassing every thing that can be imagined, and so heightened by the consciousness that we have penetrated, under the guidance of our commander, into regions far beyond what was ever deemed practicable, that it really caused a feeling of awe to steal over us, at the consideration of our own comparative insignificance and helplessness, and at the same time an indescribable feeling of the greatness of the Creator in the works of His hand." Such a scene must be reckoned an ample compensation for the absence of all vegetation.

On the 29th, the expedition was suddenly obstructed in its southerly course by an object scarcely less wonderful, a perpendicular barrier of ice, of unknown extent, whose face presented a wall of 160 feet in height. To this Captain Ross gave the name of the Victoria Barrier: it runs in an easterly direction from Mount Erebus, as the volcano was called, in the 78th degree of south latitude. This huge rampart they coasted from the 170th parallel of East longitude to nearly 165° W., hoping to find a passage to the south, but none appeared; and at length, owing to the lateness of the season and the impossibility of obtaining safe shelter for the ships during the winter months (no small proportion out of the twelve), they took a northerly course, and on the 7th of April cast anchor, for the first time since leaving Campbell's Island early in December, off the Government Paddock, Hobarton, Van Dieman's Island.

A short time only was here allowed for the needful refreshment and repairs, when the "Erebus" and "Terror" sailed for Sydney, where numerous excursions were made, and plants collected, though few of these could have the charm of novelty; and after much kindness received from Messrs. M'Leay (father and son), they then pursued their course to the Bay of Islands, New Zealand. This country presents a good field for the naturalist but unfortunately, the destination of the ships was restricted to the Northern Island, to which the researches of the botanist were consequently confined. Here resides one of the most amiable and liberal of men, Mr. Wm. Colenso,* of Piahuy, who has studied plants with great success, and sent home rich collections of the vegetable productions of the island. He accompanied the scientific gentlemen of the expedition in their researches, and has received such a stimulus from their society, that it is not too much to predict he will use his best exertions to obtain plants from every part of this highly interesting group of islands. And thus, by his means, in addition to what has been effected by Sir Joseph Banks, by Forster's voyage, by the late excellent Menzies (who chiefly botanized in the Southern Island), by the brothers Cunningham, and by Dr. Dieffenbach, Mr. Edgerley, our good friend Dr. Sinclair, and the officers of the *Erebus* and *Terror*, there is already collected a full mass of materials for a *Flora of New Zealand*,—a *Flora*, the more called for, now that the Northern Island and the northern portion of the Middle Island are becoming so thickly colonized.

The second voyage to the extreme south was commenced in November, 1841, when the vessels weighed anchor, with the design of proceeding to the Chatham Islands, in lat. 44° S., and long. 176° W., but the weather proved so thick and stormy, that to reach them was impossible, although H. M. S. *Favourite* had been appointed to meet the expedition there, and receive their despatches* for England. Foiled in this intention, they proceeded due south, passing Bounty Island and Antipodes Isle, until they were entangled in Pack ice of immense extent, between lat. 62° and 68°, from the 18th of December, 1841, till February 2nd, 1843. After this, they with difficulty reached a little higher southern latitude, namely 78° 10', than where they had been checked the preceding year, and more to the east, when they were again brought up by the same impenetrable Victoria Barrier. So late in the season, it was hopeless to search for winter quarters, and they returned northerly to the parallel of 60°, when they took an easterly course,

* Some of the many discoveries of this gentleman are published in the *Icones Plantarum* (the late Nos.), and in the *London Journal of Botany*.

doubling Cape Horn, and on the 6th of April, 1842, reached Berkeley Sound, in the Falkland Islands, the first land that had greeted their eyes since quitting New Zealand, a period of one hundred and thirty-eight days, the whole of that time having been passed under sail, or in the Pack ice, or among Icebergs. Indeed, none but those employed in this voyage can at all appreciate the difficulties and hardships that were endured. In order that this little notice may record some of the perils which have attended this Antarctic exploring voyage, we give the following extracts from a letter published in the *Athenaeum* of March, 1843, which bear all the stamp of a faithful narration, and may tend to convey a faint idea of them . . .

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As might be supposed, the cruise above described could afford no opportunities for botanizing, but the time was improved by examining the New Zealand plants that had been collected. One curious fact, however, attracted the attention of the naturalist, namely the existence and vegetation of two species of *Alga*, in the open sea and at an immense distance from land. Almost every previous voyager has noticed the famous *Sargasso weed*, though to this present day, it continues matter of dispute whether its enormous patches are propagated in the water, or at the bottom of the ocean. Very similar is the case with *Macrocystis pyraferæ* and *Laminaria radiata* (?), the two kinds of *Sea-weed* in question, which extend, in the southern regions, to the limits of the Antarctic circle; farther south, by two degrees, than any other vegetable production whatever. The former, *Macrocystis*, is the most abundant, and was at first regarded as a good sign of the vicinity of land. It was, however, seen in all the latitudes which the Expedition traversed, from 35° to the immediate neighbourhood of ice, many hundreds of miles from any shore, in scattered masses, and these so large, fresh, and green, that it was impossible to conclude that either they had been recently torn from their native habitat, or that they were undergoing a slow death and a sure one. On several occasions, specimens were picked up, generally with great difficulty in those tempestuous latitudes, and they were found, on examination, to be, in every respect, similar to such plants as were gathered in the bays ashore; not only growing with the same vigour, but increasing; the ends of the branches being furnished with delicate, broad, young, green leaves, of all sizes, separating after the manner so correctly described in Harvey's *Cape Flora*. The enormous distance from any land, proved by the tracts of former voyagers and that of our Antarctic navigators, and the slowness of the currents near the places where these specimens were collected, show that a very long

time *must* and that *ages may* have elapsed since these floating portions left the parent plant. This *Weed* did not make its appearance close to the ice, still less in that open water, which exists to the southward of the Packs. An accurate list was kept of the ships' position, and dates of the time when it was found, and highly curious it was to note how uniformly the plant seemed to fail when the temperature of the water fell below 32° or 32°, in whatever latitude that might be, and how it appeared to avoid the Icebergs; 63½° is the highest south latitude at which it was seen.

The currents that transport these weeds, are very slow indeed; probably *wind-currents*, which, with the *send* of the sea, must have wafted the original parent stock from the southern portions of New Zealand and the smaller islands appertaining to it, as far as Cape Horn. Its propagation in the water is apparently exceedingly tardy, and may possibly be effected by the agency of marine animals, which swarm about the patches of this and the *Laminaria*, their sole vegetable refuge in the higher latitudes. No roots whatever have been traced in such circumstances, nor do they seem essential to its life and increase. After separating out a single plant, perhaps thirty fathoms long, one end was invariably found green, and the other gradually more and more incrustated with *Flustra*, *Serpula* and *Bicellaria*, *Sponges*, &c.; till it terminated abruptly; the cellular substance of the stem being quite exposed, not covered with any more condensed parenchyme, but apparently bitten off; while here and there, along the stem, there were often pieces taken out, apparently by some molluscous animal.

One of the officers of H. M. Schooner *Arrow*, a very intelligent individual, has stated it as his opinion, founded on the examination of many specimens, that as the *Macrocystis* grows large, it finally weighs up the stone which was its moorings, and then the whole plant goes off to sea, which, as he conceives, explains the reason for so much being found alive in the ocean.

The other *Sea-weed*, the *Laminaria*, was not found so common on "the high seas;" and when it did occur, was generally seen running out into long branches.

To mariners who had thus been the sport of winds and waves, tossed about among Icebergs and in the Pack, exposed to great severity of cold in the midst of an Antarctic summer, even the stern scenery of the Falkland Islands, and in its winter dress, would have its charms and its comforts. There they came into the still and peaceful waters of Berkeley Sound, a long and deep inlet of the sea, at the head of which is the capital of the colony, and indeed, the only village in it, and where.

happily, the arrival of a new Governor, Lieut. Moody, R. E., with a well-selected library, offered great attractions to the officers. The needful repairs were here made to the "Erebus" and "Terror," which were hauled ashore for that purpose, and an interesting statement of the occupation of the officers is given in the "Guernsey Star" newspaper, of Sept. 15th, 1842.

"Captain Ross and the Antarctic expedition are now here. The two ships came in contact when endeavouring to escape an iceberg in the seas of the South Pole; and they will stay with us positively five or six months to repair the vessels, and to make observations. Capt. R. has erected an Observatory at the old French Fort, built by Bougainville. A most interesting series of observations is carrying on, which will be of great value to the scientific world; those on the pendulum are noted every quarter of an hour. Astronomical observations are also carefully taken by the officers. Thermometers are placed both above ground and under it, my own (it is the Governor who writes), along with my barometer, are doing duty with the rest, and have the honour to be registered also. The Anemometers, shewing the direction and force of the winds, will add much to the valuable information afforded by Capt. Sullivan, R.N., respecting these islands; and the Pluviometers are also carefully noted. The present month (May) is equivalent to the Guernsey November. A tide-gauge is placed by the jetty. Also an excellent magnetic observatory, where the dip, intensity, and variation of the needle are carefully registered by these able and practiced observers; the officers relieving one another in regular succession during the performance of this duty. And never did I meet with such devotees to science. Captain Ross's little hammock swings close to his darling pendulum, a large hole in the thin partition allowing him to view it any moment; while Captain Crozier's hammock is just alongside. The floor of this room is mother earth, from our dearth of timber.

"At my request, the Captain has been so kind as to add to these observations another series, to ascertain the rate of evaporation in these islands; and Hooker, the botanist, has obligingly drawn up a report on the Grasses; our prevailing *Graminea* being considered as unknown in Europe.

"The splendid *Tussack Grass* is the gold and the glory of the Falklands, and it will yet, I hope, make the fortune of Orkney and the owners of Irish peat-bogs. Every animal here devours this grass with avidity, and fattens upon it, in a short time. It may be planted and cut, like the *Guinea grass* of the West Indies. The blades are about six feet long, and from two to three hundred shoots spring from one plant.

I have proved, by several experiments, that a man can cut one hundred bundles in a day, and a horse will greedily eat five of these bundles in that time. Indeed, so fond of it are both horses and cows, that they will devour dry *Tussack* thatch from the roofs of the cottages, in preference to good grass. About four inches of the root tastes like the *Mountain Cabbage* (Palm). It loves a rank, wet, peat-bog, with the sea-spray dashing over it, and wherever the waves beat with the greatest vehemence, and the saline spray is carried farthest, there the *Tussack Grass* thrives the best, provided also it is on the soil it prefers. All the smaller islands, which help to form the Falkland group, and some of them are as large as Guernsey, are covered with it, and it is nutritious all the year round."

To the naturalists of the expedition, there are other charms in the animal, vegetable, and mineral productions of a group of islands, two of which are of considerable extent, one of them 130 miles long by 80 broad, and the other 100 miles by 50. Their position is interesting, too, as regards the proximity to the southern extremity of the great American continent, which, it is very clear, has materially influenced, as might be expected, their vegetation. Situated between lat. $52\frac{1}{2}^{\circ}$ and 54° south, and 57° . 20, and 61° . 46, west long., the Falklands lie about 1,000 miles S.S.W. from the estuary of Rio de la Plata, and 210 miles N.E. from Terra del Fuego. It is true that several botanists had already visited East Falkland, the only island in the group that could be investigated on the present occasion, and I believe the only one that has been at all explored. Pernetty appears to have been the first person to collect the plants of the Falklands. He accompanied Bougainville, when the latter attempted to colonize the islands, and described many of the vegetable productions. In 1825, an interesting memoir was presented to the *Academy of Science* at Paris, by M. Gaudichaud, entitled "*Flore des Iles Malouines*." This was the fruit of that disastrous ship-wreck of the French frigate *L'Uranie*, on the Falklands, by which the officers and crew were compelled to remain there during a period of three months. M. Gaudichaud had an arduous task in rescuing from the stranded ship, an herbarium formed during the voyage, of 2,500 species, which had been immersed in water in the hold, till the paper was reduced to a pasty mass, from which the specimens had to be extracted, sheet by sheet. It was an agreeable relief from this irksome and disheartening occupation to gather the products of these little-known islands. The *Flora* above alluded to, enumerated one hundred and twenty-eight species, including *Cryptogamia*, of which from forty-two to forty-six were considered new.

"The superficies of this group of islands," says M. Gaudichaud, "may be roughly calculated at about two hundred to two hundred and twenty square leagues. Part of the coast is bordered with rocks and dunes, exhibiting towards the interior some mountains of moderate elevation, and plains covered with lakes and marshes. During the winter, which is long and very severe, snow falls to a depth of many feet. The surface-soil is composed of a spongy turf which begins where the coast-sand ends, and stretches uninterruptedly over the mountains and the level lands. This soil is most unfriendly to cultivation, and French, Spanish, and English colonists have successively given up the attempt in despair, and forsaken these islands. Still there are plants which affect peaty lands, and grow here abundantly. Not a tree is to be seen, the only approach to it being a shrub, the *Veronica decussata*,* which attains a height of 6 feet, but is extremely rare, it was originally detected by Commerson, in the Straits of Magelhaens, and named, in his MSS., *Hebe Magellanica*. The aspect and foliage resemble the myrtle.† Among the larger plants of the Falklands are *Chlorotrichum amelloides*, a syngenesious shrub, about 3 feet high; the *Festuca flabellata* (or *Tussack Grass* mentioned above), whose fine fan-shaped leaves are nearly 6 feet long, and which entirely covers the islets, and finally, *Pernettya caespitifolia* and *Empetrum rubrum*, under-shrubs of moderate stature, already found by Commerson in the district of Magelhaens. The other plants seem as if they all had been levelled low, so rarely does one species rise, in the least, above the rest. They generally form compact, close, grassy tufts, very unpromising for the botanist. The prevailing tribes are *Lichens*, *Ferns*, *Mosses*, *Cyperaceæ*, *Gramineæ*, *Compositæ* and *Ranunculaceæ*. The *Algae* can hardly be considered as belonging to these islands, though they abound in the bays; they are marine productions, and have no affinity with the growth of the soil. It is very singular, that neither *Leguminosæ*, *Labiata*, *Boraginæ*, or *Chenopodææ*, groups which prevail in almost every part of the world, exist in the Falklands. Seven species of *Gramineæ*, together with three *Cyperaceæ*, and four *Junci*, are found in such profusion, and form such dense tufts, as to engross nearly all the soil, to the great exclusion of other plants. When this thick grassy turf is separated, a prodigious quantity of *Lichens*, *Mosses*, *Lycopodia*, *Marchantia*, and some other *Cryptogamiæ*, with several *phanogamous* species, may be seen beneath it, mingled with small suffrutescent plants, whose stems are weak, and creeping.

* This shrub is confined to West Falkland.

† In Jersey, where this shrub is not uncommon in gardens, and grows about three or four feet high, it is called *Bon Myrtle*.

“ When the periodical return of winter puts a close to this annual vegetation, the water which remains in the soil as in a sponge, preserves from entire decomposition those numerous plants which die, and their woody portions form a mass, which yearly adds to the amount of peat-bog. We may be allowed to conjecture that in these islands, as is the case in other parts of the world, the vegetable remains, by their gradual and imperceptible accumulation, will finally fill up the lakes.”

In the following year, namely 1826, a very similar memoir appeared in the 4th volume of the *Mémoires de la Société Linnéenne*, under the same title, *Flores des Iles Malouines*, and drawn up by the still more unfortunate M. J. Dumont d'Urville. This accomplished traveller and naturalist, as is well known, had but recently returned from a second adventurous voyage in the Antarctic regions, having escaped all the dangers attendant upon such hazardous undertakings; but on a little excursion of pleasure in the environs of Paris, he and his whole family fell victims to that most awful accident on the railroad of Versailles, in May, 1842. In the voyage, when the materials for his *Flore des Malouines* were collected, M. d'Urville commanded the “*Coquille*,” and on the 18th of November, 1822, cast anchor in the immense Bay of *La Soledad*. “What a descent,” he says, “does the botanist make, who from the shores of Brazil, is suddenly transported to the flats of the Malouines! To those immense forests, countless shrubs, and impenetrable thickets, which had perpetually arrested his steps and gaze, succeed bare hillocks, and boundless plains, not a tree, or even a real shrub, breaks the uniformity of these vast solitudes. The traveller, assailed by wind, rain, and hail, has often to traverse many miles before reaching the slightest shelter; for the earth itself, as uniform as its vegetation, presents no jutting rock among its valleys, nor any of the hollows which are so common in wild and uncultivated regions. Notwithstanding, however, this extraordinary nakedness, there is no country where the soil is so thickly clad with a dense, though low, covering, for almost all the indigenous herbaceous plants and little shrubs, are provided with creeping roots and off-sets that strike into the ground, by which they are firmly fastened to the soil, and woven one among another,—a wonderful provision of nature, doubtless intended to protect vegetation from the destructive power of those tempestuous winds so prevalent in these latitudes.

“ A stay of twenty-six days, and twelve botanizing excursions, afforded one hundred and eight distinct species of flowering plants; and I shall hardly suppose that more than a quarter part of the productions of the island can have escaped my notice, or that more than one hun-

dred and forty species, or thereabouts, can exist on the Island of Soledad, for my researches were very diligently pursued. The circumstance, too, that M. Gaudichaud, a skilful and close observer, only found, during his stay of nearly three months, eleven plants which I had not gathered, confirms this opinion: and out of these eleven, the *Azolla* and *Rumex acetosa* are only cited by him from memory, while the *Veronica decussata* was given him from the other island, thus reducing the difference between us to eight. On the whole, therefore, the Flora of these islands may be said to be richer than a first glance would lead one to suppose. *From the London Journal of Botany for May, 1843*

The Tussock Grass of the Falkland Islands

In the *Guernsey Star* new-paper of September last appeared the following statement:—"The splendid Tussock Grass is the gold and glory of the Falkland Islands. Every animal there feeds upon it with avidity, and fattens in a short time. It may be planted and cut like the Guinea Grass of the West Indies. The blades are about six feet long, and from 200 to 300 shoots spring from one plant: about four inches of the root eats like the Mountain-Cabbage; it loves a rank, wet, peat bog, with the sea-spray over it, it is nutritious throughout the year, and all the smaller Falkland Islands are covered with it."

This could not fail to excite attention, and so many of our correspondents have made inquiries about it, that we have endeavoured to ascertain what the facts are relating to it.

The earliest notice that occurs of the plant appears to be in Pernetty's *Voyage aux Isles Malouines*, published in Paris in the year 1770. We are not acquainted with this work, but the statement contained in it is, we presume, the following, quoted by Burney in his "Collection of Voyages," (vol. v. p. 144.)—Pernetty says, "We were half a league distant from two flat islands, which, at first view, appeared as if covered with small copse-wood, but, as we afterwards discovered on landing, they were only tall Bulrushes or Cornflags: they grow each of them about two feet and a half high, and afterwards shoot forth a tuft of green leaves nearly of as much height more."

The next trace of it is in Bougainville's account of his voyage in *La Boudeus*, in 1766 — "All the sea-coast," says this navigator, "and the islands in the interior of the Falklands, are covered with a plant which is improperly called a Cornflag; it is, however, a species of Grass, of the most beautiful green colour and growing to the height of six feet. It forms a hiding-place for lions and sea-wolves, and served as a shelter for ourselves during our travels. A house is formed in a very short space of time, the inclined stems, when fastened together, serve as a roof, while the dry straw makes a tolerably good bed. It was with this plant that we likewise thatched our houses. The root is sweet and nutritious, and is preferred by beasts to any other food.

Later travellers speak of it in similar terms. Goudot and says that the base of its stem has the pleasant taste of the *Cabbage Palm*, so much esteemed in tropical countries. According to the account of Freycinet's Voyage (p. 145) we find the following statement — "Finally, there is a plant of still greater interest, which furnishes nearly all the year round abundance of roots for our food, namely a *Pot Grass* (*Festuca flabellata*), which grows to statures of the *Isle of Penguins*, and other small islands, to the French Bay, and which, according to M. Orme is not very unequal produced in the tract of all the Falklands. This plant grows from a stem four feet high, its leaves are sheathing and compressed. The top of the stem, to the height of five or six inches above the root is white and soft, of an agreeable flavour resembling that of a *Filbert*. This substance consists of the lower sheath, with the young central leaves and stem firmly encased within each other. Its flavour may be also compared to that of the *Cabbage Palm*, so highly esteemed."

The most complete account, however, that we have seen, is the following, which Sir William Hooker has been so obliging as to extract from the letters of his son, Dr. Joseph Hooker, now with Captain James Ross's expedition. — "Near the sea-coast a very noble Grass grows in immense abundance, called *Tussac*. It forms quite an extraordinary feature in the landscape, covering immense tracts of land, especially on a sandy soil. Its roots form great balls, which rise five or six feet above the ground, and are often as much in diameter. The culms spring from the top of them, bearing long



leaves, which hang down all round in the most graceful manner, and are themselves six or seven feet in length. These heaps, or tussacks, grow generally apart, but within a few feet of one another, the intermediate space of ground being generally quite bare of vegetation, so that, in walking among them, you are quite hidden from view, and the whole Tussack ground is a perfect labyrinth. Cattle thrive admirably, and soon get fat upon this Grass; and so fond are they of it, that when they can get it they will touch nothing else—and with horses it is the same."

Such is Dr. Joseph Hooker's graphic account of this plant. Gaudichaud describes it as a handsome Grass, from four to six feet high, with fan-shaped leaves, like those of some Iris, from which circumstance, no doubt, Lamarek called the species *Festuca flabellata*.

The soil on which this plant grows is described by Gaudichaud (*Ann. Sc.* v. 90) as a spongy bog, utterly uncultivable, and D'Urville adds (*l. c.* vi. 47 l.), that at its edges this bog forms in many places a cliff (*escarpement*) four or five feet high. Dr. Hooker also states that the whole district is covered with peat bogs or grass lands. It would therefore seem as if the plant might be introduced with advantage into Ireland, that however, is a point that cannot be determined otherwise than by actual experiment.

Concerning the climate of the Falklands, we have tolerably exact information. D'Urville states that it is much more temperate than might have been expected from its latitude. From the observations made by himself and others, he concludes that the thermometer scarcely rises above 15° cent. (59° Fahr.), or falls below zero cent. (32° Fahr.), and according to Bougainville the winter is very mild, and snow lies on the ground only for a short time. M. D'Urville also states that in 1822, at the beginning of December, the month which answers to June in Europe, the highest temperature observed was almost always between 12° cent. (51° to 66° Fahr.) On the other hand, Sir Woodbine Parish tells us that in the Eastern Island, the thermometer generally ranges as high as 75° in summer, and sometimes falls to 26° in winter; he, however, confirms the French statements, that snow disappears in a few hours, and that ice is seldom above an inch thick, (*Journal of Geog. Soc.*, iii. 95). The days of summer are described by the same authority, as long and

warm, with occasional showers, producing a rapid vegetation. All this would suit the west and south of Ireland well enough, but would hardly justify our entertaining expectations of the Grass succeeding in England or Scotland, except in particular localities, even if the plant should so far change its southern habits as to forget that our winter is its summer.

We learn from Sir Wm. Hooker that only a few days since a packet of the seeds of the Tussack Grass was received at the Royal Botanic Garden, Kew, but they were in bad condition, and offered small promise of germinating, although from the same parcel of seed a plentiful supply of young plants was coming up in Dr. Joseph Hooker's Garden at the Falklands where they had been drilled in rows, like turnips. Let us hope that some of these young plants will be introduced in the Wzrd's Cases which have been sent out from Kew for the purpose.

It is right to add that there is another sort of Tussack Grass at the Falklands, much inferior to the *Festuca flabellata*, and produced, as we are informed by Sir Wm. Hooker, by the *Carex tritida* of Cavanilles. This is probably what is mentioned in *Burney's Voyages* (vol. v. p. 144) as "A kind of Grass, a foot and a half high, which spreads over every part to the tops of the hills. The soil is of a dark-brown colour, and is formed into a mould by the annual decay of the Grass. It rises with a spring under your feet from the roots of the Grass being interwoven with it."

Those who interest themselves in procuring the Tussack should take care to distinguish between the two kinds.

For the opportunity of publishing a view of the places in the Falklands, where this Grass occurs, we are indebted to Sir William Hooker, who has kindly placed at our disposal a drawing made on the spot by W. E. Wright, Esq.—*Gardeners' Chronicle*, March 4th. 1843.

Monthly Proceedings of the Society.

Wednesday, the 10th May, 1843.

The Hon'ble Sir J. P. Grant, President, in the chair.

The minutes of the last general meeting were read and confirmed.

Capt. G. E. Hollings, who was proposed at the last meeting, was elected a Member.

Robert Stewart, Esq., Merchant, Calcutta, was proposed as a candidate for election by Mr. Storm, seconded by Mr. John Allan.

Presentations to the Library.

1. The first number of a quarterly issue of the Transactions of the Agricultural Society of Bombay.—*Presented by the Society.*

2. The Planters' Journal, Nos. 42 to 45.—*Presented by the Proprietor.*

3. The Literary Gleaner, No. 3 of vol. 2.—*Presented by the Proprietor.*

4. The India Journal of Medical and Physical Science, No. 4, of vol. 1.—*Presented by the Proprietor.*

Museum.

1. Specimen of the plant, seed, and oil produced from the seed of the plant, alluded to in his former communication.—*Presented by Mr. Tennocky, Deputy Collector at Bolundshukur.*

2. Samples of Wool from a Patna and from a half-bred Sheep.—*Presented by Mr. Storm.*

Mr. Storm submits these samples for the purpose of comparing the improvement made by crossing with the Merino Ram.

3. Samples of Flax and Hemp in a dressed and undressed state, also a sample of *Siam*, for the purpose of comparison.—*Presented by Mr. Sconce, Collector at Chittagong.*

4. Samples of the fibre of the *Urtica tenacissima* (koonkooorah) in a bleached and unbleached state, grown and manufactured at Rungpore.—*Presented by Mr. Dove, on behalf of the grower.*

The samples were transferred to the Hemp and Flax Committee.

5. A large quantity of seed of the Cuba, Gibali and Blulsa Tobacco.—*From the Society's Nursery Garden.*

Resolution regarding Notice of Motion.

The Motion regarding the proposed Floricultural Society, of which notice was given by Mr. Speede, at the last meeting, was brought forward for disposal, but owing to the absence of the mover the motion fell to the ground.

The Secretary here begged to call the attention of the meeting to the late frequent failure of attendance on the part of members at meetings succeeding those at which notices of motion had been given by them. In several instances during the last six months, these motions had been adopted by some other members who happened to be present, and this had been allowed, in consequence of there being no rule to the contrary. He conceived, however, that it would be desirable to remedy this, and with this view he begged to submit the following motion :—

Proposed by the Secretary, seconded by Dr Mouat —

“ That in the event of a party not being present who has a notice of motion before the Society, the same be struck out, unless the mover appears by deputy, and that a new motion be required.”

The Hon'ble the President stated that he concurred in the propriety of adopting the above motion : it was then put to the vote and carried unanimously.

NOTICE OF MOTION.

Floricultural Society.

Mr. Speede desired to express his regret at having been too late to make the motion of which notice had been given by him at the last meeting. In accordance with the latter clause of the Resolution which had just been passed, he now begged to give the following as a new notice of motion :—

“ That the establishment of a Floricultural Society having been proposed, this Society do afford the same such encouragement as may from time to time occur, by the loan of their rooms for Meetings during the infancy of the new Society, &c., under formal application for such indulgencies to a general meeting.”

Appointment of a Committee to enquire into the extended Introduction of Indian wheats into British Ports.

Mr. Speede begged to call the attention of the meeting to a subject intimately connected with the agricultural and commercial interests of India, and one which, doubtless, in the opinion of the Society, would be considered worthy of support, he alluded to the great public measure which, from accounts received by the last Mail, the Court of Directors had brought forward, with a view to obtain for India the introduction of wheat, the produce of this country, at a nominal rate of duty

Mr. Speede stated he conceived, that when the Court did turn its

... to promote the interests of agri-

culture in this country, it behoved this Society, as a public Indian Body, to express its gratitude for, and concurrence in the proceeding. He particularly desired to point out the immense quantities of foreign wheat which the necessities of Great Britain caused to be entered for home consumption, amounting in the year ending the 5th January last to no less than 2,667,911 quarters, none of which was of Indian production, that reviewing the past ten years, it would be found that in 1833 out of 218,171 quarters only 2,696 were from India and Ceylon, which in the returns were mixed up together, and he had not at hand the means to separate them; in 1843 there were 471 quarters out of 133,991; in 1835, 33 out of 42,628; in 1836 none; in 1837, 310 out of 455,871; in 1838, none; in 1839, two quarters out of 2,631,556; and in 1840-41, and 42, there was no admission of Indian wheat, although the average for home consumption was nearly 2,500,000 quarters annually. Again, as regards the quality of our wheat; did it receive the encouragement of a free market this would be improved, and although some of the attempts at shipping home had failed from want of care in selection, and in securing its reaching home in a marketable condition, yet, when it had been well selected, sent home new, and carefully stowed, it had reached its destined port in good condition. That we have an earnest of improvement, Mr. Speede observed, we need only refer to the pages of the Journal of this Society to prove, for it would there be found, that the experiments of Mr. Bridgman, in Gorruckpore, have shewn that the Hope Town wheat, the common old red and the starch wheats thrive well, and may be advantageously grown here, and that several other sorts would be an improvement on the indigenous wheat, of that part at least of India, the common red kind, yielding as much as ten times the produce of the best specimens of Indian wheat.

Mr. Speede further observed, that in looking too at the prices offering an encouragement to the merchant, it may be found, that the average cost here does not exceed Rs. 1-12 per maund, which, at a rough estimate, would be about 28 shillings the quarter, to which, adding say 25 per cent. for charges, the wheat could be landed under 33s.; and the latest accounts of the markets at the beginning of March shew the lowest description of English grown wheats to be 43s.; the highest 55s., and the average, (official) 48s. and 4d. per quarter, which is by no means a high rate. At the same time Wolgast wheat was 36s., but bearing a duty of 20s., was only to be placed in the market at a cost above the best English. Looking at the preference given to foreign production over that of this important colony of India, there is

another point of consideration, for whilst Great Britain taking from Prussia about 700,000 quarters of wheat annually, only sends in return to the value of £200,000 of manufactured goods, India takes to herself to the value of from 4 to 6 millions of English manufactured goods annually.

Mr. Speede added, in conclusion, that he conceived the above to be strong reasons, for shewing some consideration and even favor to the produce of our colony of India, and it is to be recollected that the opening of a market for our wheat would oblige us to take more manufactures in return for it, thus adding not a little to the comfort and prosperity of the ryots, who would benefit largely from the extended cultivation of a produce already indigenous and largely grown, and would learn, as a necessary consequence, to improve their condition and seek more comforts from our British manufactures. For these reasons, therefore, and under these impressions, he begged to move.—

“That a Committee be appointed to enquire into the capabilities and advantages of giving encouragement to the export of wheat from this country; and to report upon the expediency of our expressing our gratitude, as an Indian public Society, to the Court of Directors, for pressing on the Home Government the important measure of the admission of Indian wheat into British ports on a nominal scale of duty, and at the same time expressing our earnest support to the measure as one calculated to benefit and advance the interests of India.”

The motion was seconded by Mr. W. Storm.

The Honorable the President said, that the motion being only for a Committee, he should not oppose it, thinking the subject upon which it was proposed that the Committee should enquire one of great importance to the agricultural interests of India, and highly deserving of investigation. But he thought it his duty to state thus early in the proceeding, that if the Committee should report affirmatively in the terms of the last part of the motion, that would be a report to which he could not agree; namely, the expressing our earnest support to the measure of admitting Indian wheat into British Ports at a nominal duty, that is, in substance, free of duty, because he did not think that a measure which the English Government ought to adopt, with reference to the interests of England, as an imperial question, and thought it, therefore, one which no colony of England ought to press upon its Government from views of its colonial interest. He therefore disapproved of the application of the Court of Directors, in so far as it desired the admission of Indian wheat at a nominal duty. Had it confined itself to praying for the admission of Indian wheat at such mode-

rate duty, as without being unfair to the agriculture of England, might encourage the growth of wheat in India, for export to Great Britain, he should have approved of it. He had never entertained but one opinion upon the English Corn Laws, namely, that the import of corn, as of every other produce of the skill and capital of other countries, should be subject to such duties, and such only, as should countervail the taxation imposed upon the home-producer, leaving the home-producer and the foreign-producer thus upon a footing of the same equality as if there were no English taxation upon either. If Indian wheat were to be introduced into England, duty free, it would be necessary to impose upon the Indian grower all the taxes paid by the agriculturist and the land-owner in England.

The President added, in conclusion, that perhaps the mover and seconder would consent to the leaving out the words in the motion "at a nominal scale of duty," which would leave it in his (the President's) opinion, unexceptionable.

Mr. Speede agreed to omit those words. The motion, so amended by leave of the meeting, was made and seconded as above, and carried unanimously, being as follows:—

"That a Committee be appointed to enquire into the capabilities and advantages of giving encouragement to the export of wheat from the country; and to report upon the expediency of our expressing our gratitude, as an Indian Public Society, to the Court of Directors, for pressing on the Home Government the important measure of the admission of Indian wheat into British ports, and at the same time expressing our earnest support to the measure as one calculated to benefit and advance the interests of India."

The following gentlemen were appointed members of the said Committee, with leave to add to their number, viz. Messrs. Joseph Wills, M. Gladstone, R. Lattey, C. R. Prinsep, Wm. Storm and G. F. Speede.

*Report of Finance Committee relative to the amount of award for the
Quarterly Horticultural Exhibitions.*

The following report from the Finance Committee, on the question submitted for their consideration at the last meeting, was next read:—

Report of the Finance Committee.

Agreeably to the Resolution of the last Monthly Meeting of the Society, that the suggestion of the Kitchen and Fruit-garden Committee, "that a sum of £800 be set apart for prizes to be awarded

at the proposed quarterly horticultural exhibitions, be referred for the consideration of the Finance Committee.—

Your Committee beg to report, that having had before them an estimate of the probable receipts and disbursements of the Society for the remainder of the year, they are of opinion, that the funds of the Society will not admit, at present, of this proposed addition of 500 Rs. to the annual grant of 300 Rs. which has hitherto been allowed for the object, and which has been already disbursed for this year, at the exhibition held on the 26th January.

While, however, your Committee cannot recommend the grant *in toto*, of the amount required, they would beg to suggest,—fully agreeing with the Garden Committee on the desirableness of a change from an annual to quarterly exhibitions,—that an additional sum of 200 Rs. be placed at the disposal of the Committee for prizes to be awarded either at one or more exhibitions during this year, which ever, in the opinion of the Committee, may be deemed more desirable.

(Signed) M. S. STANTON,

„ JAMES HUME,

Calcutta, 8th May, 1843.

„ RAMCOMUL SEN

Moved by Mr. Speele, seconded by Mr. Byrne, and resolved—That the Report of the Finance Committee be confirmed.

Nursery Garden,—Olive and Cane Culture

A report of the monthly visit of the Garden Committee to the Nursery, on the 28th ultimo, was submitted.

The Committee consider it advisable, that the chief attention should be directed to the keeping up of a sufficient supply of the best Olive Canes, and that a trial should be made with some on the principle so successfully adopted in Bourbon and Mauritius, and obligingly detailed by Mr. Hugon. The Committee further add, that the Caboo Clover and Lucerne Seed which was presented by Major Napleton, have failed, but the vegetable seeds have succeeded tolerably well.

The following is Mr. Hugon's memorandum:—

The Canes are planted in rows which are 5 to 6 feet distant the cane holes are 2 feet long, 8 to 12 inches deep, 3 to 4 inches wide; the distance between the holes is 2 feet. The earth from the holes is placed between the rows and forms a ridge, the slopes should be cut horizontally,—two cane tops or heads, having each 2 or 3 good eyes each, at least, and not having belonged to canes which have flowered, are placed in each hole, they ought to be about 18 inches

of earth may then be thrown on them : some object to this, and merely put a little light straw to prevent the sun drying up the plants. The bottom of the holes ought to be even and hard, so that the cane root in the firm soil."

The names of Messrs. Hugon and Hodgkinson were added to the Garden Committee.

Formation of a Branch Agri-Horticultural Society at Bhauglepore.

The Secretary mentioned, that the first communication he had the pleasure of submitting was from Major Napleton, the Secretary of the newly formed Agri-Horticultural Society at Bhauglepore.

[For this letter, see page 153 of Correspondence and Selections.]

On the motion of Mr. Staunton seconded by Mr. Storm, it was unanimously resolved to include the Bhauglepore Society among the Branch Institutions, and to afford it every possible assistance. The Secretary was directed to notify the same to Major Napleton.

Further particulars regarding an Oil-producing Plant from the Bolandshuhur District.

The Secretary intimated, that in addition to the information furnished by Mr. Tonnochy to the Society, and incorporated in the March proceedings, regarding an oil-producing plant in the district of Bolandshuhur, he had the pleasure to submit some further interesting particulars from that gentleman on the subject.*

Dr. Griffith offered to send a fragment of Mr. Tonnochy's plant Dr. Royle by the next mail, and it was transferred to him for that purpose.

Cultivation of Hemp and Flax in the District of Chittagong.

A long and interesting letter from Mr. Sconce, relative to the flax and hemp samples, which have been alluded to among the presentations, and to the proposed extended culture of these staples at Chittagong, was next submitted.

Mr. Sconce's communication and samples were referred to the Flax and Hemp Committee for consideration and report.

Cultivation of Carolina Paddy and the Sissoo Tree at Ceylon.

The Secretary stated, that he had the pleasure to submit a letter with which he had been favoured by the Hon'ble Mr. Anstruther, Colonial

* For this communication, see the Fourth Number of the Journal

Secretary at Ceylon, regarding the introduction of Carolina Paddy in that Island, and the cultivation of the Sissoo tree.

After offering his thanks for a supply of seed, lately transmitted Mr. Anstruther states that the Carolina Paddy sent to him by the Society, has been distributed; it has failed in many cases, but in some it has succeeded. Mr. Anstruther encloses a report from the Province in which it has succeeded best.

Mr. Anstruther further mentions, that he has also distributed a supply of Sissoo Seeds, which were sent to him from the Calcutta Botanic Garden,—in some instances it has succeeded very well, and in the Botanic Garden at Kandy, there are now plants ten feet high.

The thanks of the Society were directed to be given to Mr. Anstruther for his kindness in sending the report alluded to, which was transferred to the Committee of Papers for the Journal.†

Horticultural Garden at Lucknow.

A letter from Captain Hollings, the Secretary of the Horticultural Garden at Lucknow, was next submitted. Captain Hollings intimates his intention of preparing with as little delay as possible, an account of the present state of the garden, in the meantime he has been kind enough to afford some detailed information on the subject, and has expressed his readiness to make experiments on any Seeds the Society may wish to forward him for that purpose.

The Secretary informed the Meeting, that a large box of seeds had been prepared for the use of the Garden, and would shortly be despatched to Captain Hollings.

Report on Arrow-root, grown and manufactured at Purulea, in Chota Nagpore.

The Secretary intimated, that in accordance with the request made at the last Meeting, he had submitted to Dr. Mouat the specimen of Arrow-root presented by Mr. Hampton, and that gentleman has favoured the Society with the following opinion thereon :—

“ I have carefully examined the sample of Arrow-root sent to me for analysis, and stated to be the produce of a garden at Purulea, near Bancoorah.

“ It may be made much better than it is, by a little more washing and drying; for, at present, it is not so inodorous as the best samples found in the market.—is not perfectly free from moisture, and although it makes a tolerably good jelly, contains a very small amount of inso-

† This Report has been published in the Fourth Number

table matter : all of which, can easily be got rid of, by the *extra* processes mentioned above."

The Secretary mentioned, that Mr. Speede had likewise obligingly furnished him with a report on this sample, to the following effect. —

"I have carefully examined the Arrow-root sample from Purulea, and consider it superior in quantity to either of the other specimens that you sent me with it, at the same time there is considerable room for improvement.

"It has the peculiar crumbling feel under compression that marks the best Arrow-root, and is smooth, soft, and sparkling. The color is dark, it is also foul and speckled. It does not easily mix, and in hot-water becomes lumpy and clogged. The jelly it forms is strong, but not equal to the best. Altogether I should consider it might hold in the London market, according to advices, dated 31st January, which I have received, a value of 3*d.* per pound."

A letter was read from Dr. George Buist, Secretary of the Agricultural Society of Western India, forwarding the first number of the Quarterly Issue of the Transactions of that Institution, and requesting to be favored in return with the Journal of this Society.

The Secretary informed the Meeting, that the request of Dr. Buist had been anticipated.

A communication from Dr. Royle, relative to the proposed despatch of Fruit Trees and Flower Bulbs in due season, was also submitted; and it was agreed, that a further sum of £25 should be remitted to that gentleman to meet the necessary expenses.

For all the foregoing Presentations and Communications, the thanks of the Society were accorded.

Wednesday, the 14th June 1843.

The Honorable Sir J. P. Grant, President, in the Chair.

Robert Stewart, Esq., who was proposed at the last meeting, was elected a member.

Candidates for Election

John Hampton, Esq., of Beore Factory, Gorruckpore, proposed by the Secretary, seconded by Mr. Storm.

Captain S. B. Goad, 1st Cavalry (Sidd Department), proposed by Mr. Adam F. Smith, seconded by Mr. Balfour.

J. F. Morris, Esq., of the Civil Service, proposed by Mr. E. Bental seconded by Mr. G. F. Cockburn.

Major General E. Cartwright, Commanding Presidency Division proposed by Mr. C. S. Stowell, seconded by the Secretary.

F. Gouldsbury, Esq., of the Civil Service, proposed by Captain Showers, seconded by the Secretary.

Presentations to the Library

1.—Proceedings of the Agricultural and Horticultural Society of Madras.—*Presented by the Society.*

2.—Report of the Bombay Chamber of Commerce for the 3d Quarter of 1842-43.—*Presented by the Chamber.*

3.—The Indian Review and Journal of Foreign Science and the Arts Nos. 1, 2, and 3 of vol. 1.—*Presented by the Proprietor.*

4.—Report of the Sudder Dewany Adawlut of the N. W. Province for 1840.—*Presented by the Agra Government.*

5.—The Planters Journal, No. 46 to 48.—*Presented by the Proprietor*

6.—The India Journal of Medical and Physical Science, No. 3 of vol. 1.—*Presented by the Proprietor.*

7.—The Calcutta Literary Gleaner, No. 4 of vol. 2.—*Presented by the Proprietor*

Museum.

1.—Two boxes of Burmah Tea —*Presented by Mr. D. C. Mackay.*

Mr. Rennie, to whom the above was transferred, together with the sample of Burmah tea, which was presented by Mr. Agabeg at the April Meeting, states, that he considers both specimens to be of a very inferior quality, possessing a strong coarse flavor. Mr. Agabeg's specimen, Mr. Rennie mentions, is better, because it rather tastes more like tea than the other, which is very harsh and bitter, but neither can be said to resemble any tea imported from China.

2.—Specimens of New Orleans, Sea Island and Egyptian Cotton.—*Presented by Lieut. Colonel Ouseley, Agent to the Governor General at Chota Nagpoor.*

Col. Ouseley intimates, that the above specimens are the produce of seed received from the Society. The plants were unirrigated, and the ground but little manured. Colonel Ouseley has distributed the seed among almost all the chiefs of his Agency.

3.—Samples of Cotton produced from acclimated Mexican and Sea Island seed, from New Orleans seed, of last year's importation, and from common country seed.—*Presented by W. Quintin Esq., at Gaya.*

Mr. Quintin states, that the above is the produce of his garden during the past year. The season was so very unfavorable for cotton experiments, that Mr. Quintin does not anticipate so favorable a report on these, as on the samples which were submitted last year,* but he is desirous to learn the opinion of the Committee, more particularly on the produce of the acclimated seed.

Mr. Quintin mentions, that the large supply of Mexican cotton seed which he obtained last year from the Society proved a complete failure. Better success, however, attended the Cape and American vegetable seeds. "We have had," adds Mr. Quintin, "peas, turnips, carrots, lettuces, and beet root equal in size and flavor to English growth. The oyster plant is now in season, and deserves great notice, it resembles a parsnip in appearance, but it is of a softer and more pulpy nature: its flavour closely resembles an oyster, and it recommends itself more particularly by coming into season when most of the other vegetables are out."

At the close of his letter, Mr. Quintin asks for a further supply of fresh cotton seed, and requests that it may be sent by *banghy*, to save the season.

The Secretary informed the meeting of his inability to comply with Mr. Quintin's request, in consequence of the late withdrawal of the Government frank from this and all other despatches of the Society.

The above seven samples were transferred to the Cotton Committee for report.

4.—Seeds of a superior variety of vegetable marrow, grown at Puralea.—*Presented by Captain Hanington.*

This seed, Captain Hanington mentions, may be sown between the end of October and the beginning of December, earlier and later sowings are always unproductive. The fruit should be used immature when about the size of a turkey's egg.

5.—A supply of the seed of the *Pandanus racou*, or Screw Pine, with leaves of the tree in a prepared state, and a bag made therefrom.—*Presented by Mr. T. F. Henley.*

The Secretary stated, that in addition to the above, he had the pleasure of submitting a paper which had been drawn up by Mr. Henley, containing a description of the tree, the mode of preparing the leaves, of manufacturing them into bags, &c.

The best thanks of the Society were ordered to be given to Mr. Henley for these presentations. The seeds were transferred to the Garden

* A Report on these samples has been published in the First No. vol. 1, of the Society's

Committee, for trial at the Nursery, and the paper was given to the Committee of Papers, for publication in the Journal.

A bag containing specimens of a black vegetable dye, named Make-na, and of silk dyed with the same; specimens of silk dyed with indigo mixed with lime; of yellow silk; of tea as used by the Shans; of Shan hemp; walnuts from Yunan in China; and grass cloth from the Nicobar Islands.—*Presented by Dr. McClelland, on behalf of Mr. A. H. Sander.*

7.—Further specimens of black vegetable dye.—*Presented by Dr. McClelland, on behalf of Mr. Wm. Warwick.*

(Further particulars regarding these specimens will be found in the body of the Proceedings.) * *

8.—Sample of arrow-root, manufactured from plants grown in the garden of the Horticultural Society of Lucknow.—*Presented by Captain Hollings.*

9.—Twelve canisters of arrow-root, grown and manufactured under his superintendence at Beerbhoom.—*Presented by Baboo Sumboo Chunder Ghose.*

In his note accompanying the above, the Bahoo mentions, that he has sent 1,000 lbs. of the powder to Calcutta for sale, and it is his intention, if the return of the sale be remunerative, to make about 10,000 lbs. next year.

10.—Seed of the superior variety of capsicum, of which a specimen was submitted at the April Meeting.—*Presented by Mr. Burnell.*

Mr. Burnell states, that in growing this fine kind of capsicum, no other than the ordinary plan has been adopted, of sowing in pots in the month of August, and transplanting in the open ground at the close of the rainy season.

11.—A fine bunch of grapes from his garden at Gyretti, in the neighbourhood of Calcutta.—*Presented by Mr. William Storm.*

The fruit has been grown in the open air, and the trees have never had any manure. Mr. Storm mentions, that he has had a large crop this season, and several of the bunches were much larger than the above. Mr. Storm has adopted Hoare's method of pruning.*

A few plants raised from the oil seed, which was presented from Mr. Tonnochy at a former meeting, were also placed on the table for the inspection of members.

Floricultural Society.

The motion of which notice was given by Mr. Speede at the last meeting, regarding the proposed Floricultural Society, was brought forward,

* For full particulars on this and other points connected with the culture of the vine, see

but in consequence of the absence of the mover it was taken off the board; with liberty, however, to renew it on any future occasion.

Importation of Indian Wheat into British Ports.

The Committee appointed at the 1st meeting to enquire into the capabilities and advantages of giving encouragement to the export of wheat from this country, submitted a report of the proceedings of their preliminary meeting held on the 22^d ultimo.

The Committee state, that having taken into consideration the subject for which they had met, it was agreed that previous to entering further into the merits of the question, it would be very desirable to obtain as much information as possible on all points connected with the subject of enquiry, and with this object in view, they resolved to circulate letters to such gentlemen, Members of the Society and others, who are likely to afford the desired information, the following queries to form substance of such circular:—

1st.—On what description of land is wheat grown in the districts you are acquainted with?

2nd.—What rent does the ryott pay per biggah? and what is the size of the biggah in square yards?

3rd.—What is the cost of cultivating wheat land, including seed and rent?

4th.—Is such land irrigated, and if so, how often during the growth?

5th.—When is it sown and reaped, and what the extent of crop in Calcutta bazar maunds?

6th.—Are other crops sown with it, and what are they?

7th.—At what rate per Calcutta maund could good wheat from your district, be landed in Calcutta?

8th.—How many descriptions of wheat are grown in the districts with which you are acquainted, and what are their respective qualities?

9.—Can you favor the Society with small samples of each description procurable?

The Committee then give the names of the gentlemen whom they consider likely, from previous correspondence, and the interest they are known to take on this and other subjects of an agricultural nature, to have it in their power to afford the desired information; but as there may be many other residents in the interior capable of assisting, to whom circulars have not been transmitted in consequence of their being unknown to the Members, the Committee trust, that on being made acquainted with the foregoing queries through the more public medium of these proceedings, they will also give the Society the benefit of their practical experience.

The Committee have agreed to hold another meeting so soon as this information has been obtained.

Carey Testimonial Fund.

The Finance Committee submitted a memorandum in continuation of that given in at the February meeting, relative to the Carey Testimonial Fund. In accordance with the resolution passed on that occasion, the co-operation of the Non-Resident Members of the Society had been sought, and up to the present time, the sum of 360 Rupees had been obtained from them, this, added to the sum previously contributed by Resident Members, has increased the amount to Rs. 1,560; of this sum, Rs. 1,454 has been deposited in the Bank of Bengal, and the difference has been expended for printing and other incidental charges.

The Committee stated in their former report, that judging from the expence which had been incurred by the Asiatic Society, for a bust of Dr. Mill by the late Sir F. Chantrey, they conceived that the amount then available would not suffice for the object contemplated, but with reference to the cost of only 120 guineas for a bust of Sir C. Metcalfe, by another sculptor, the Committee are of opinion, that the amount now at the credit of the fund will be almost, if not quite sufficient, to meet all expenses.

The Secretary suggested whether, it would not be desirable before remitting the amount to England, to obtain at the first instance, a clay bust of the late Dr. Carey. Through the kindness of Dr. Wallich, the Society was in possession of an engraving which is considered an excellent likeness. From this a bust could be made by a native sculptor, at a trifling cost, and if considered a faithful resemblance, it could be forwarded for the guidance of the sculptor at home.

Dr. Mouat instanced a case similar to that proposed by the Secretary which had proved very successful. The party engaged on that occasion is a sculptor employed at the Medical College. Dr. Mouat added, that if the suggestion were agreed to, he would see to its being carried into effect.

The recommendation was adopted by the meeting, and the kind offer of Dr. Mouat was unanimously accepted.

Arrear of Subscriptions.

The Secretary stated, that two or three instances had lately occurred of members having withdrawn from the Society without liquidating their arrear of subscriptions, and the amount was still unpaid, notwithstanding that several applications had been made to them. He thought it proper to bring the circumstance thus prominently before the Society, as he was at a loss how to act on the occasion, in consequence of there

being no rule to meet such an unexpected emergency. He would beg to read a correspondence which had lately passed between him and a gentleman resident at Midnapore, shewing the position in which the Society was placed for want of some rule for future guidance.

At the close of the perusal of the correspondence, and after some little discussion, the following resolution, proposed by Mr Roberts, seconded by Mr. Balfour, was unanimously agreed to and ordered to be incorporated among the rules of the Society—"That when a member of the Society intimates his desire to cease to be a member, his name be forthwith erased without continuing his subscription, subject nevertheless to his name being published among the defaulters, (as per resolution passed at general Meeting of 14th September 1842.) if his arrears of subscription are not paid."

Flora of Swan River.

The Secretary drew the attention of the Meeting to a very fine collection of dried plants which were laid on the table. He stated, that they had been collected at Swan River by Mr Mylne who had lately returned to Calcutta, with a view of disposing of them, together with a large assortment of seeds, to the public. Mr Hume read a letter from the Colonial Chaplain at Swan River, commending Mr Mylne to the notice of the Society, and requesting such assistance as could be afforded in enabling him to carry out his undertaking. The Rev. Mr. Wittenoom mentions, that Mr. Mylne intends returning to Swan River, and has been specially commissioned to use his best exertions to introduce into the colony the Silkworm and the Tea tree, and adds, that the Society would be conferring a great obligation on the Colony by assisting in the furtherance of these important objects.

The Secretary informed the Meeting, that on the receipt of this communication, he had lost no time in giving Mr. Mylne such assistance as was then practicable. An advertisement, intimating the arrival of the seeds, had been placed on the cover of the last published number of the Journal, and since the work is so widely circulated, he trusted it would have the desired effect of bringing purchasers. He might add, on the authority of Dr. Griffith, that the plants are likely to prove a great acquisition to the gardens of India, particularly to the more elevated districts.

The Secretary was requested to intimate to Mr. Mylne, that although it was out of the power of the Society to purchase his collection of plants and seeds, yet it would be glad to render him any other available assistance. The request of co-operation in regard to the procuring of tea plants and silk worms was unanimously responded to.

Particulars regarding a black Vegetable Dye from the Shan Country.

The Secretary stated, that he had been favoured by Dr. McClelland, through Dr. Griffith, with two interesting communications from Messrs. A. H. Sanders and Wm. Warwick, relative to the samples of black vegetable dye, silk, hemp,* &c. alluded to among the presentations. Mr. Sanders's letter is dated from Moulmein, and is addressed to Dr. McClelland, and that of Mr. Warwick, which is dated from Zemmie, the capital of the Shan country, is addressed to Captain Wm. McLeod, Assistant to the Commissioner, Tenasserim Provinces, and has been transmitted by that gentleman to Dr. McClelland.

Mr. Warwick at the close of his letter, puts this query. Pray enquire if there is any premium for the production of a black dye that requires no sulphate of iron, and effects a dye?"

In reference to this query, the Secretary drew the attention of the meeting to the premiums offered by the Society of Arts for the Sessions 1841-42, under the class of Chemistry and Mineralogy. From that it would appear, that the Gold Isis Medal is offered "for the best set of experiments on the various substances from which durable black can be made suitable for painting in oil or water colours, or for printer's ink,"—and although it did not come within the meaning of the communication before the Society, yet the dye would no doubt be considered of sufficient interest to demand further investigation.

Dr. Mouat agreed in this opinion, and offered to test the dye and favour the Society with the result. The offer was accepted with thanks, and it was resolved to forward the result of such enquiry, with samples of the dye and silk to the Society of Arts, with a view of obtaining further information as to the value, &c. of the article.

Progress at the Government Experimental Cotton Farms at Coimbatore.

A letter from Dr. Wight, Superintendent of the Government Cotton Farms at Coimbatore, was next submitted.

After alluding to the out-turn of the crops this season, Dr. Wight mentions, that having learned from the proceedings of the Society the success which has attended the more recent trials of Hemp and Flax culture in Bengal, he is anxious to give them a trial at Coimbatore, but not having any seed, he would be obliged to the Society if it could furnish him with a small quantity.

Dr. Wight adds, that he has it in his power to repay the kindness of the Society in sending him some Cotton seed in the cold season, by

* This is apparently the fibre of the *Urtica tenacissima*, regarding which some interesting particulars will be found in the Transactions of the Society, vol. III, page 11, and vol. V, page 19.—Sec.

placing at its disposal about 2000, or more pounds, of New Orleans Cotton seed, all of excellent quality, and acclimated by two years' culture in Coimbatore.

The best thanks of the Society were offered to Dr. Wight for this handsome offer, and the Secretary was directed to take advantage of it. It was directed, that a supply of Hemp seed should be forwarded to Dr. Wight.

Culture of Hemp and Carolina Paddy at Arracan.

The Secretary next desired to submit a letter with which he had been favoured by Capt. Bogle, the Commissioner of Arracan, acknowledging the receipt of a quantity of English and Russian Hemp Seed, which had been forwarded to him by the Society. Capt. Bogle intends having the seed put in the ground very shortly, and he has great expectations that it will thrive well, and be much esteemed.

Capt. Bogle mentions, that the Carolina Paddy sent him last year, did not arrive until the season for sowing it was over, it was consequently of no use; but he adds, "I consider it of such importance to the interest of this Province, that a large quantity of this valuable seed should be supplied annually, that I shall feel exceedingly obliged by any assistance the Agricultural Society may be able to afford me."

The Secretary intimated, that he had been unable to comply with this and several of the recent applications for Carolina Paddy. He would beg to suggest, that steps be taken to procure a further supply for trial next year. This suggestion met the approval of the meeting, and the sum of 20*l.* was voted for the purpose.

Communications on various Subjects

The following additional papers were submitted:—

1. From Dr. Robt. Wight, dated from Coimbatore, offering a few suggestions for the better transmission of plants from one part of India to another

2. From Edward O'Riley, Esq. dated Amherst, 18th May, affording some additional information regarding his Sugar and Coffee cultivation at that Province.

3. From Capt. G. E. Hollings, Secretary of the Branch Horticultural Society at Lucknow, forwarding a second report on the present state and prospects of the public garden at that station.

These three communications were transferred to the Committee of Papers for the Journal.

4. From Major Napleton, Secretary of the Branch Agri-Horticultural Society of Bhaugleporc, returning the thanks of the Society at being enrolled among the Branch Institutions of the Agricultural Society of

India, and enclosing a report of their first Horti-Floricultural shew, held on the 10th of May.

5. From J. P. Ledlie, Esq. Secretary of the Agri-Horticultural Society of Allahabad, announcing the dissolution of the Society.

Mr. Ledlie encloses copy of Proceedings of the Society at a meeting held on the 1st of May, from which it appears, that "in consequence of the intended removal of the Sudder Court and Board to Agra, the decrease in the number of members, and consequent inadequacy of the funds to keep up the garden in an efficient manner, it is deemed expedient to dissolve the Society on the 30th June next."

It has been agreed, that the funds, stock of the Society, &c. shall be made over to the Magistrate and Collector of Allahabad to be applied, as far as practicable, to carry out the original object of the Society.

At the conclusion of the meeting, the Secretary brought to the notice of Members, the assistance which Government had formerly rendered the Society by giving several valuable papers for publication in its transactions. He thought that on an application to that effect, the Government might perhaps be disposed to renew this assistance, more particularly as the Journal of the Society offered so good a medium for immediate and wide circulation.

Resolved.—That the Secretary be requested to address Government on the subject.

For all the foregoing presents and communications, the thanks of the Society were accorded.

Correspondence and Selections.

HEMP AND FLAX CULTURE AT CHITTAGONG.

*Communicated by A. SCONCE, Esq., in the following letters, dated
Chittagong, 17th March and 25th April, 1845.*

Herewith I have the pleasure to send you specimens of flax and hemp grown by me here this last season ; and it would much oblige me, if you or any member of the Society could give me a character of these, each as a marketable article. The flax is grown from what I may call acclimated Europe seed, that is, from seed reproduced for two or three years from imported seed. I had enough to sow two patches of land in my garden, and the produce upon the whole has been very much as you see it. The hemp is grown from country seed (ganjah) : as to what is good or bad hemp, I know nothing, but I am pleased with what I consider the success of the Agricultural experiment ; and comparing the fibre with that of the common ~~seed~~ which is grown a good deal in this district, even to my eye there is no doubt of the superiority of the hemp. The seed of both kinds was sown in November.

I have done nothing to either flax or hemp, except after steeping to separate the woody from the towy fibre ; both are in the rough, and I should be glad to know how the articles would be received in the market in this state, rather than after an unskilled attempt to clean or dress them.

There are one or two doubts which I should like to have solved. 1st. Would the value of either article be deteriorated by being exported in this state to England, there to be dressed? 2nd. Supposing that from delay or during transit, no deterioration would result, whether it is better to run the risk of injuring the manufacturing value of this article by dressing here, or, to leave the dressing to be done in England? 3rd. Whether by attempting to dress, want of skill would not cause an unnecessary loss in the out-turn? Of course attention to these matters is more necessary, or perhaps only ne-

cessary in the beginning of an undertaking, which is new to the farmers in all its branches; but I have so fully satisfied myself, that the growth, both of flax and hemp, may be prosecuted successfully, that I am unwilling in any way to endanger what even in spite of my own conviction I will call an experiment, by attempting too much.

I have now to submit a proposition, which I will thank you for your support in laying before the Society. I beg to propose, that small premiums be offered for the cultivation and manufacture of flax and hemp in this district; not that I would exclude other districts from the benefits of a similar measure, but I confine myself to operations which to some extent it is in my power to encourage, if not originate. Our land measure corresponding with a beegah is called a "*kanee*." It is about one-fourth larger than the common Bengal beegah of 1,600 square yards. I think five premiums of ten rupees each, should be offered for the best cultivated five *kances* of flax, that is, a premium for each *kanee*: and the same number of premiums, of the same value, for the best cultivated five *kances* of hemp, a premium for each *kanee*. As to the amount, my object has been not to go beyond the limit, which the resources of the Society could afford, and at the same time to hold out an inducement to the cultivator which he himself could calculate was twice as much as he should receive from a crop of rice. If the Society can add to one or all these proposed premiums, so much the better. I also think that ten premiums of ten rupees each, should be offered for the best ten maunds of manufactured flax and hemp equally divided, a premium for a maund. In this case, as in the last, I have no objection to any advance upon my minimum limit, which the finances of the Society can afford. My object shall be to interest chiefly those who are familiar with the cultivation of linseed, (which is common enough for the purpose of extracting oil,) and the country *sunn*. It may very well be that in one year competition will not come up to more than half the extent provided for; but even so much is an advance and a gain, and we may expect will be followed by some important results. I have myself commissioned a small quantity of hemp seed from England; but I shall be glad to receive what seed you can spare me, both flax and hemp. I have had an opportunity of observing this season, the very great difference between flax grown

from Europe and from country seed ; the latter being softer and finer, but very much shorter and very much weaker. Is there so great a difference in the produce of hemp ?

Even my small crop of this season has been ample enough to be matter of interest and gratification to the natives who are about me. Hitherto they have known linseed as being valuable only for its oil, and ganjah as yielding an intoxicating drug ; now both are presented to them as yielding a finer and stronger staple than any other article with which they are acquainted. And in short, seeing no prospect of the cultivation of either flax or hemp being undertaken on a scale which secures its own success, I trust you will grant me your co-operation to lead on the people themselves by a small beginning and small degrees to vary their present system, by adopting a new and most profitable culture.

Since this was written I have received your note of the 22nd March, and after all I have said, I need not add how much your offer of the Riga hemp seed pleases me.

25th April.—Perhaps the specimens which I now send you of flax and hemp are unnecessary. They are of the same growth as the last. I have added two samples of cleaned flax and hemp.

I also send, for comparison's sake, a sample of the common *sunn* of the district.

REPORT OF THE FLAX AND HEMP COMMITTEE ON THE ABOVE-
MENTIONED SAMPLES.

(Read and confirmed at the general meeting on 9th August.)

In accordance with the Resolution passed at the general meeting of the Society on the 10th May, your Committee have had before them the samples of hemp, flax, and sunn, grown and prepared at Chittagong, together with the communications of Mr. Sconce, by whom these musters have been forwarded. After a careful examination of the former, and an attentive perusal of the latter, your Committee beg to submit their Report, first on the quality of the samples, and secondly on the several points contained in Mr. Sconce's letters :—

QUALITY OF SAMPLES.

A. Undressed Hemp.—If properly prepared, this would be a valuable article of commerce ; in its present state it is unfit for shipment : the fibre is exceedingly strong and clean, but the admixture of tow spoils the appearance, and deteriorates the quality.

B. Dressed Hemp.—This sample is partially hackled ; is of uneven strength, some of the fibres being strong, others very weak ; this article is not so well adapted for shipment as *G. Crotalaria juncea*.

D. Undressed Flax.—This sample contains more tow than flax ; it is badly prepared, dirty, and not adapted for the home market.

E. Dressed Flax.—Strong, clean, of very superior quality, but of short staple ; if it were a little longer, say six inches, it would realize a very high price in the home and continental markets.

G. Sample of Sunn (Crotalaria juncea) or Indian Hemp.—Quality in every respect superior, clean, strong, of even fibre, would meet with an extensive and ready sale in Europe ; it would pay better if not hackled, but merely scutched.

In addition to the above, your Committee would beg to call the attention of the Society to the memorandum appended to this report. This memorandum has been obligingly furnished by Mr. Deneef. As it contains much practical information, more particularly as regards improvement in the mode of preparation, your Committee would beg to recommend that a copy thereof, together with the samples (C. and F.) of *sunn* and flax, which have been grown by Mr. Deneef in the neighbourhood of Calcutta, and are submitted by him for the sake of comparison, be forwarded to Mr. Sconce, for the information and guidance of the native cultivators.

2nd. In regard to the two first queries of Mr. Sconce, as to whether these articles might not be exported in their undressed state, your Committee would remark, that not only would they be almost unmarketable in that condition, but that the expense of carriage, freight, &c., would fall so heavy, as to render it very unprofitable to the exporter. With respect to the third question, there is no doubt that want of skill in dressing always deteriorates the quality, as well as quantity, of the out-turn. The natives are well aware of this practical truth. It has been mentioned by a member of your Committee, as illustrative of this fact, that among the dressers of *sunn*

in the district of Hooghly, one man, for want of this essential knowledge, will suffer a loss of eighty per cent., while another more practised hand will not lose so much as twenty per cent.

3rd. With reference to the suggestions of Mr. Sconce in regard to the offer of certain premia for the culture of flax and hemp at Chittagong, and also for the articles themselves in a manufactured state, your Committee, taking into consideration the advantages which will probably result both to India and Great Britain from the growth and manipulation of flax and hemp, (the preparation itself being likely to afford employment to thousands in this country,) would strongly recommend, that the Society appropriate the sum of two hundred rupees for carrying into effect the objects alluded to in Mr. Sconce's letter. This sum they would apportion in the manner recommended by Mr. Sconce, viz.

Five Premiums of ten rupees each, for the best cultivated five	
kanees of <i>flax</i> ; i. e. a premium of 10 rupees for each kane, Rs. 50	
Five Premiums of ten rupees each, for the best cultivated five	
kanees of <i>hemp</i> ; i. e., a premium of ten rupees for each	
kane,	50
Five Premiums of ten rupees each, for the best five maunds of	
manufactured <i>flax</i> , i. e., a premium of ten rupees for each	
maund,	50
Five Premiums of ten rupees each, for the best five maunds of	
manufactured <i>hemp</i> , i. e., a premium of ten rupees for each	
maund.	50
Total Rupees.	200

In conclusion, your Committee would further recommend, that with a view to assist Mr. Sconce in his laudable attempts towards the improvement of these useful staples, that the Society do place at his disposal a set of the necessary implements for dressing flax and hemp, and that Mr. Deneef be requested to furnish instructions for their application. The cost of these implements (5 in number) will not exceed 16 rupees.

(Signed) GEO. F. HODGKINSON,

JOSEPH WILLIS,

„ C. K. ROBISON,

• G. T. FRED. SPEEDE.

„ ROBT. WATSON,

CALCUTTA, 7th August, 1843.

REMARKS BY MR. DENKEF, ON SAMPLES OF CHITTAGONG HEMP,
FLAX, AND SUNN.

*A.—Sample of the true Hemp of Commerce, the produce of Chittagong,
in an undressed state.*

The *quality* of this hemp is excellent, but the first process to which it has been subjected, has not been properly performed. It has, in the first place, been steeped too long in the water, and the fibres have also been taken off while the stalks were immersed in water, the staple has thereby been weakened, and it has caused a superabundance of codilla or tow.

The proper mode would be to steep the stalks for three or four days in water, they should then be taken out and allowed to dry perfectly, after which the fibres should be taken off the stalks simply by the hand, and without any further trouble. They will then become, in appearance, like the accompanying sample of *sunn* (G.) but the staple will be better than that of the *sunn*, and it will fetch a higher price in the English market. I should say, that had this sample of hemp been prepared in the manner above mentioned, it would realize full £25 per ton. But even in its present state, I think it would fetch about £18 per ton.

B.—Sample of dressed Hemp grown at Chittagong.

In its *outward appearance* this is a beautiful sample, but it has been dressed *too well*. By too well, I mean that the preparation of even so small a sample as this must have occasioned a great loss of material, must have given much trouble, and occupied a long time, consequently it would not answer as an article of commerce. Besides, it is not necessary to dress it so fine: if prepared in the manner above recommended, it will fully answer for a foreign market.

*D.—Sample of undressed Flax grown at Chittagong, from acclimated
Europe seed.*

This is a good quality flax, but it labors under the same disadvantage as sample *A*, and the same remarks in regard to dressing, &c. are applicable to it.

E.—Sample of dressed Flax grown at Chittagong, from the same seed.

The staple, though short, is most beautiful, but the mode of preparation is far too expensive to admit of its yielding a profitable return, even were it to sell at the value I affix to it, viz., £60 per ton. This sample has been hackled. It should be prepared like the accompanying sample (*F.*) which has been grown from country seed. The cost of preparation is simple (as before mentioned) and cheap, and although it would fetch £16 or so, less than sample *E*, yet the diminished cost in the preparation, &c., would more than compensate for this deficiency in value. . .

G.—Sample of Sunn (*Crotalaria juncea*) grown at Chittagong.

This is also a good quality sample, but like samples *B* and *E*, it has been prepared in too expensive a manner to admit of its being profitable. It is much better than my sample of sunn, and perhaps would fetch £20 per ton in the English market, but I think the remarks in regard to sample, *E* and *F* are equally applicable to this.

After the favorable report I have given on these samples, it is almost needless for me to add, that I consider the soil and climate of Chittagong to be admirably adapted for the growth of hemp and flax, but particularly for the former. All that appears to be wanted, is a proper and cheap mode of preparation such as I have attempted to describe. If this is followed out, I think these two staples, especially hemp, are likely to prove a great source of profit to parties embarking in their culture.

CALCUTTA, May 22, 1843.

COTTON CULTIVATION AT COIMBATORE—PRESENTATION OF ACCLIMATED COTTON SEED.

Extract of a letter from Dr. ROBERT WIGHT, dated Coimbatore, 14th July, 1843.

"I have much pleasure in acknowledging the receipt of four packets of Sea Island cotton seed, all of which have arrived in excellent condition. In compliance with the intimation conveyed in your note of the 19th ultimo, that a supply of our cotton seed would be

most acceptable to the Society, it affords me much pleasure to advise you of the despatch of two bandies to Madras, loaded with 2100 lbs. of cotton seed, (about twenty-six maunds.) Of these 300 are Bourbon cotton seed, I believe, of the very best quality, having all been raised from seed carefully picked in the first instance, and every bad plant afterwards thinned out when growing. The cotton obtained from it was of the first quality, and I hope when grown in Bengal, will not disappoint you. The plant is exceedingly hardy, bears all weathers, and is so easily satisfied in regard to soil, that in this district it is currently cultivated on lands that will produce nothing else, being no better than a heap of quartz and granite stones, mixed with a small quantity of red earth, the produce of their decomposition. In wet soils, it runs too much to stalk, and unless it has a long series of dry weather, while ripening, its crop will lead to disappointment. On light dry soils it succeeds well, and gives fair crops.

The charge incurred for the conveyance of this seed to Madras is thirty-eight rupees, and can be adjusted with Binny and Co., to whose care it is consigned, with instructions for them to forward it to Calcutta by the first favourable sea opportunity, and will I hope reach you early in September. I trust in good time for your sowing season.

The crops generally in this district have this year fallen greatly below the average, and judging from the price of seed this season, as compared with the last, I should estimate the falling off this year at not less than 40 per cent. on last year's returns. The seed is nearly all consumed in the district, and not liable to fluctuations of price, except as caused by variations in the supply, and this year it is *now* 50 per cent. dearer than it was last year in October, indicating a great falling off in the supply. The cotton crop is likewise deficient in quality, but is notwithstanding 30 per cent. higher priced than last season, and that rather owing to the deficient crop than augmented demand. Under these circumstances, we can have no right to complain, because our crop has fallen short of our expectations by nearly 30 per cent. As a convincing proof of the truth of these statements, I may mention, that I have sold to native dealers a quantity of cotton at $2\frac{1}{2}d$ the pound, which last year would not have fetched $1\frac{1}{2}$, if indeed it could have found a purchaser on

any terms, and which would not at this moment realize 3*d.* in Liverpool, even after all the charges of transmission had been incurred. In a word, it was the refuse and trash of our farms."

PROPOSITION FOR INTRODUCING THE TELFAIRIA PEDATA INTO INDIA.

(From a Member of the Society.)

This plant appears, from the account given of it, to be worthy of being introduced into this country. It is mentioned in the following terms by Sir W. J. Hooker, in the Encyclopedia of Geography:—"A climbing plant lately discovered on the coast of Zanzibar, of very easy cultivation, and producing an esculent fruit three feet long, and full of seeds as large as chesnuts (264 in one fruit), which are as excellent as almonds, and of a very agreeable flavor. they also yield an abundant oil, equal to that of olives. It was originally brought by M. Bojer, of Mauritius, from Pemba, on the shores of Zanzibar, where it grows in the forests, enveloping the trees with its branches, and sometimes with a stem 18 inches in circumference. The seeds have been distributed to Bourbon and New Holland, and by the Missionaries to New Zealand and Tahiti. At Mauritius it has thriven so well, that it produced stems 30 feet high; and in the stove of the late R. Barclay, Esq., of Bury Hill, to whom Mr. Telfair sent seeds, it grew so luxuriantly, that the pruning knife was in constant requisition to prevent its filling the whole house. A plant so easy of cultivation, must soon become common in all countries, and thus will Mr. Telfair have the honor of giving a most useful vegetable to mankind, as well as a name to a new and very beautiful plant."

The last words allude to the name *Telfairia*,* given by Sir W. J. Hooker to the plant. It was, however, named *Jolliffia Africana* by M. Bojer, in compliment to M. Jolliffe, who originally brought seeds from the east coast of Africa to the Mauritius, under which name it is entered in Paxton's Botanical Dictionary, with the synonyms *Telfairia peltata* (pedata?) and *Fenillia peltata*. In the last edition of Loudon's Encyclopedia of Plants, it is thus described: "Male flowers with a turbinate 5-cleft calyx, and a fringed 5-petaled

* The specific name given in the Botanical Miscellany is *Pedata*, but *Volubilis* in the Encyclopedia of Geography.

corolla, and 5 stamens, which are disposed in 3 bundles. Female flowers having the limb of the calyx 5-toothed, corolla as in the male, and a 3-5 lobed stigma. Fruit fleshy, long, furrowed, divided into 3 twin cells. Seeds compressed, reticulated. Leaves alternate, pedate, of 5 oblong-ovate leaflets, with waved and distinctly toothed margins, pointed at both ends." A more extended description and figures of the parts of fructification are contained in Hooker's Botanical Miscellany, Vol. II. In an account of the plant by M. Vincent, of the Mauritius, subjoined to that description, it is said to be known in the island under the common name of *Liane Lajoliffe*, and to have produced, after various failures, perfect flowers and fruit at Bois Chéri, the residence of Mr. Charles Telfair.

As the plant is said to produce beautiful purple flowers in great profusion, and is at the same time economical, it seems equally adapted for gentlemen's gardens, and for covering the huts of the natives, and is on these accounts brought to the notice of the Society.* Should it be considered deserving of introduction into this country, it will be necessary first to obtain seeds from Mauritius,† with a view to raise male and female stems, the plant being a diæcious perennial; after which it may be propagated, as suggested by Paxton, by cuttings of the flowering shoots, which will root without difficulty, and will flower much earlier than the seedlings.

*Remarks on the American Cultivator. By THOMAS JAMES FINNIE,
American Cotton Planter.*

To the Honorary Secretary of the Agricultural Society of India

SIR,—I have the pleasure to submit for your Society, a lithographed drawing of a new cultivator I have lately had made up, with a description of it; if it is worth a place in your journal, it is very much at your service. I have, &c.

(Signed) THOMAS JAMES FINNIE.

Agra, 11th July, 1843.

* It is mentioned by Mr. Nimmo and Dr. Royle, among the plants deserving of being introduced into this country. See "Suggestions received by the Agricultural Society of India, for extending the cultivation and introduction of useful and ornamental plants, with a view to the improvement of the Agricultural and Commercial Resources of India."

† Mr. T. F. Henley, a member of the Society, has obligingly offered to procure seeds from Mauritius.

THE AMERICAN CULTIVATOR.

The cultivator, or hoe harrow, is considered one of the most valuable instruments of Agriculture in the Southern States of America, by the planters of which it is looked upon as only surpassed in usefulness by the plough. The cultivator is used principally in cotton, Indian corn, tobacco, and sugar fields, at a time when the ground is only required to be lightly stirred, and kept free from grass and all extraneous vegetation; to keep which in check in a hot moist climate, is one of the greatest difficulties the planter has to contend with. The cultivator not only accomplishes this in a most effectual manner, and at the same time at the lowest possible cost, but brings the ground into fine order for the growth of the plant, as well as for any subsequent work, it may require. From the form of the instrument it will easily be seen, that it can only be used in drill husbandry; that is, among plants sown in straight rows; but it can be used with advantage in any vegetable production so planted, and will be found particularly useful among root crops.

The instrument may be so constructed as to admit of being widened or contracted at pleasure, which form will be found most useful when the rows to be worked are of different widths. The one alluded to has not been constructed on that principle, but any mechanic of ordinary ingenuity can easily apply it to those he may make from the model here represented. There are nine teeth, so arranged, that not a particle of ground through which it passes escapes uncut, and every blade of grass and weed is radicated; but the two hindmost middle teeth might, without prejudice to the instrument, be dispensed with, as the one in front and three on each side are amply sufficient. The teeth have been given the peculiar shape here represented, in order to allow them to go well beneath the surface of the ground, and pass on without digging any dirt with them, as in the case with the awkward shovel-tooth cultivators, so often used by thoughtless planters to the great injury of their cattle, without any corresponding advantage from superior work. Judgment, or more properly speaking, experience, is necessary to know when the cultivator should be used; that is, the ground ought to be in good order, not too wet, which will clog the instru-

ment, and injure the land for subsequent working, as well as retard the growth of the plant it was intended to facilitate. This is a labour-saving machine, and to save labour is as necessary in this country, as in any other I am acquainted with

Report on the state and progress of Agriculture in the Deccan for the year 1842. By Dr. ALEX. GIBSON, Superintendent of the Government Botanical Gardens.—(Bombay Presidency.)

[Presented by Government, June, 1843.]

1. As two and a quarter years have elapsed since I made a report as to the proceedings in this department, I deem it fitting that some account should now be given, the more especially as the accumulation of valuable acquisitions by the overland route has most materially added to the prospects of utility held out by an institution of this kind. Nearly every overland despatch continues to add something to our store of exotics.

2. I shall first give a detail of agricultural operations as carried on, and secondly, notice seriatim the various acquisitions interesting to the horticulturist and the botanist.

3. It may be necessary that I should premise by stating, that the gardens under my charge are.—

1st, Dapoorie. 2nd, The subsidiary garden, at Hewra and Neergora. 3rd, The cultivated portions of the Hill Fort of Sewnere applicable to the rearing of trees which are affected by the heat of the plains.

4. These subsidiary gardens are entirely supported from the garden allowance originally appropriated to Dapoorie alone. The latter has not suffered by the partial reduction of its expences, as produce sales have enabled us to keep establishments on their old footing, if not rather to increase them.

5. The original intention of the subsidiary gardens was, that they should be appropriated solely to agricultural products of a superior class; and this end has been as much as possible kept in view, but owing to the superiority of the Hewra soil over that of Dapoorie for choice trees and shrubs, I have raised many of the most valuable kinds there, as I should probably have lost them had they been planted out in the inferior and dead black soil of Dapoorie.

6. I now proceed to particularise and remark on the several agricultural products. The limited quantity of ground precludes the possibi-

lity of making extensive experiments in the various descriptions of exotic cotton.

7. What I have tried since my last report, has not led me to alter my opinion as to these cottons being unsuited to the dry climate and generally shallow soil of our districts in the Western Deccan. The Upland Georgian plant at one time gave promise of success; the plants have generally looked leafy and healthy,—too great luxuriance having been kept down by timely pruning. The cotton formed while the moist climate of the south-west monsoon lasts, is healthy and full blown; but no sooner does this moisture pass away, than the pods shrivel, yield a diseased cotton, discoloured by the ravages of insects on the seed, and in fact good for nothing. The portion cultivated at Dapoorie last year was sown in the only patch of good alluvial soil which exists there; the plants remained stunted and unhealthy, presenting exactly the appearance of those described as having been sown at Broach by the American planters. The soil in which ours was sown was a fine reddish alluvial; the seed was of the most choice description, having been received partly from the Collector of Rutnagherrie, and partly from Dr. Royle of the India House.

8. One exception to the general want of success which occurred with these sowings of Upland cotton, took place in one of two beegahs sown by Mr. Dickinson of the sugar manufactory, the seed having been furnished by me from the sources above-mentioned. In the successful beega, about six Deccan maunds of seed-cotton were produced: this, at the rate usual with cotton in this district, will give about $1\frac{1}{2}$ Deccan maunds of cleaned cotton; a fair return, but not large, if we consider that the field had the benefit of canal irrigation. The cotton is short in the staple but having healthy seed, and the wool is consequently free from discoloration.

9. The experiment here, I do not deem to be one on which a general conclusion could be based, inasmuch as the field enjoyed the shelter of a hedge on one side and tree plantations on other two sides—few of these appliances are to be found in nine-tenths of the villages in the Deccan. The soil in which the cotton was grown was a medium black. Much injury has often been done, and unnecessary expense incurred, by hasty conclusions, drawn from partial premises like those afforded by the above experiment, which I have noticed rather with a view of warning than of encouragement.

10. For example, a person unacquainted with the general features of this country, with the great modification of climate (irrespective of latitude) caused by our north-west wind blowing over such an extent

refined, or refined article as made in Hindoostan. This sort is preferred by a good many natives, as they say they are not able to sell the West Indian kind; others again have, on a trial of this plan, regretted having undertaken it, as they say Goor pays them better.

25. There are several strong objections to the likelihood of extension of this Hindoostanee process.

1st. The primary outlay, which may amount to rupees 20.

2d. The very great difficulty of procuring refining pots of the requisite shape and smoothness; very few indeed of our potters can attempt them any more than they can a garden flower-pot.

3d. The tediousness of the process. * For all these reasons, I have continued, as at first, to make the sugar of the Government's garden on the West India plan, and have now for four seasons found it meet with a ready sale; however, this I could only reckon on in consequence of selling it wholesale to a native who retails it to European customers, for every day's experience confirms (what I had the honour to state to the late Revenue Commissioner five years ago, in deprecation of an intention which then existed of establishing a Government manufacture of raw sugar)—viz. that natives will not use this description of sugar. Were this raw sugar allowed to enter the English market on West-India duties, *then* there would be a chance of the extension of this description of manufacture, especially in places near the coast; but as the act forbids this until we can supply the wants of our own population, and the said population declines the article, and is also likely to decline manufacturing on any scale of magnitude the

vernment, in proposing them, did so from a deep-laid scheme of increased future taxation; and this idea was the more confirmed by the fact of cane-plants and cotton-seed being distributed gratis. Now the people here gladly purchase cane-plants for the selves at enhanced rates, even so high as rupees 6 per pand, being upwards of rupees 160 per acre.

26. *Senna, Henbane, and other Medicinal Products.*—Of these, the growth has been rather successful at Hewra, at Dapoorie a failure. Of Senna, the full supply for the medical stores (lbs. 1000) was furnished in March and April last. The species cultivated are the Tinnevelly and Mocha, if, indeed, these be not identical, which I now believe them to be.

27. I was somewhat startled by the leaf produced by one small parcel of seed sent me by Captain G. Yerdell from Aton. The seed appeared identical with the common, but the leaf was rounded. Subsequent importations from Captain Haines produce the true plant. I had on hand a considerable surplus of leaf after supplying the medical stores, but the season was too advanced to admit of its being sent to Bombay. Next season I hope to have a surplus sufficient for export. So d in the bazars here, it fetches a very poor price, as it is not more appreciated than the imported kind, though the latter consists half of stalks. But I should think that for the supply of bazars farther inland, say to the east of Nuggur, it might be profitably grown, as the carriage of so bulky an article from the coast must be expensive.

28. I have still on hand (after distribution and fresh sowing) about 10 lbs. of the seed of last season, so that I trust Government may see to procure seed in 1841 has not been in vain. I have also a supply of the Tinnevelly supply, which reached me in 1840. A seed germinated, while that sent by Captain Yerdell in loose bags, came up well.

The Senna crop, I find, requires a sloping, or a light gravelly-soil; it grows well in reddish alluvial water settling at the roots; therefore it should not be sown in beds if sown before No-

I sowed the first crop in June or July, and cut it down (leaving small stem) four or five times between that and February. After many-cutting it is hoed, watered, and allowed to seed.

1. *Henbane*.—Of this the supply, Extract and Leaf, continues to be regularly furnished to the medical stores. The cultivation is easy, and may be carried into the height of the hot season. It does not grow in the first three rainy months. As this medicine is, I believe, now considerably used in veterinary practice, I wonder that its cultivation,

not more extended to inland stations, where European medicines for horse-practice are expensive.

31. *Colocynth*.—I have not yet been able to raise this plant here in quantity sufficient to enable me to make a tender for supply to the medical stores. Last year my crop of the plant was destroyed by the porcupines, but I continue spreading the plant, seed of which I originally brought from the eastern Deccan, as it is not indigenous here, though the *C. pseudo Colocynth* is common. I rather wonder that the manufacture of the extract has not been permanently followed up by some person resident at Surat, in conformity to the hint I gave in the memoir which Government did me the honour to have lithographed in 1836. The plant is most abundant on the sea-shores there, and the other requisites for the compound-extract are to be had abundant and cheap in the drug-shops of that city. In the memoir in question, I pointed out the fact, which was afterwards disputed but subsequently confirmed, that this species is the true *Colocynth*. In Mr. Graham's list it appears as the *C. Hippo Colocynth*. The comparison of a specimen of leaf sent me by Dr. Burn, decided the point at once. When it is considered that the compound-extract costs 1*l.* 1*s.* per lb., and that a large quantity is annually consumed, it must be allowed that the subject is important.

32. *Elatarium*.—The seed of this active and expensive medicine has been sent me from the India House. One plant has survived, as has one of three seeds previously given me by Dr. Lush. The plants repeatedly died down; at last (I am happy to say) I have one in fruit, which promises to mature.

33. *Foxglove*.—Many plants raised from seed sent by Dr. Royle, have been from the first sickly, and give as yet (18 months) no promise of vigour.

Hemlock.—Seed from the same source. Puny rather than sickly—may yet do. Plants put out close to a running stream have perished.

35. *Calumba Root*.—I am not aware that this valuable exotic has ever yet been introduced into the Bombay presidency. Some roots have been commissioned from Mosambique for me, by the active exertions of Furdonjee Murzbanjee Mohed, of Damaun, a zealous cultivator of Medical Science; and as I was informed that the plants had arrived alive, I have reason to hope that they are now on their way here.

36. Of indigenous Medicinal Plants, possessing valuable qualities, we have in the gardens, Lemon Grass, Pomegranate, Golmicha, Cosalpo Bondei, Truposantues Amas, Byrtonia Epygea, Trichosanthe Laim, Pent-a-ptua Arjun, Bignonina Indica, Cassia Fistula, Indigofera 3 sh., Sephrosia. &c. &c., Mucuna Prurita, &c. &c. For most of these, we have

occasional applications from natives for use in sickness. These applications are always complied with.

37. *Cereal Grains*.—Of these the cultivation is as much as possible limited to those necessary for crop rotation. Of the celebrated Vittoria Wheat of Carraccas, about which so much has been written and said, I received a fresh supply last season, by the kindness of the indefatigable Mr. White, of Plymouth. I sowed it; but found it as on the former trial, not superior in quantity of return, and decidedly inferior in colour and quality, to even our medium wheats in this country. It does not ripen a day sooner than our Indian kinds. It may be a valuable grain in Carraccas or the West Indies, where I fancy there is no great choice of Cereals; but to us who possess such a variety, it is of no account. Of the Rye and Oats, liberally supplied from the India House last season I did not find the growth successful—the former did not even ear, and the oats were much inferior to the acclimatized oat sent from Bengal; even the latter, as I think I mentioned in my last report, I found to be too husky to be given to animals, as it caused a chronic cough. I have, therefore, discontinued the growth of the grain. I have this season received from the India House, a supply of wheats of various and choice descriptions; and I have also commissioned from Messrs. Lawson and Sons, Edinburgh, men eminently successful and skilful in the choice of agricultural products of the best kind, a farther supply. These I hope to receive by next mail in time for the sowing of the season.

38. *Potatoes*.—The growth continues to extend; and this year the April crop afforded about 1,000 bullock loads from the villages in the vicinity of Jooneer, westward.

My expectations have been answered as to these villages being most favourably situated for the supply of the Bombay market, as this affords the chief outlet. The Neilgherry seed appears not to degenerate, at Neergora, as it does in most other places. This season the cultivation has extended to a good many villages at the head of the ghauts.

This I have not verified from personal experience yet, but from the information of others, and also from having seen the ghaut people employed in ransacking the emptied fields at Neergora and Belsur, for potatoes left after digging.

39. That the cultivation is *bona fide* considerably extending, I further judge from the fact of the demand for seed potatoes being great. In June I gave out considerable quantities, on condition of receiving an increased quantity on the ripening of the crop.

The public have complained, and I believe with reason, that the large potatoes grown in this district, are liable to the same objection in the crop of the hot season, as those at Mahabuleshwur; viz. the liability to spoil. This liability increases with the heat, so that this year the loss was even greater than usual. For this we now find that the most effectual remedy is, to store the roots for 20 days after digging, instead of sending them off immediately as heretofore. Within that time the unripe ones get discoloured and are removed. The remainder can be kept for months. We did not ascertain the value of, and necessity for, this precaution, till too late this season. In future it shall be acted on in as far as my influence extends.

40. An additional precaution is, that all the roots having irregular knobs and prominences, should be rejected for export, as these prominences are adventitious growths, being young potatoes stuck on to the body of the old one, and affect the keeping of the whole.

41. The above hints may seem tedious, but will be found useful. The crop with us is a biennial one; viz. in October and in April.

Those of the rains-crop succeed best in black soil, the others in the reddish alluvial.

42. *Tapioca*.—This product has made no way among the people, nor was it to be expected that in a great bread-corn country like this, a crop which takes a year to ripen for flour, could ever do so. As a mere esculent for roasting to be eaten on fast-days, I thought it had a chance of success, but as yet I find that the sweet potatoe, and the common potatoe, are preferred to it. For the Konkuns it might be of more consequence, seeing that rice is the staple there; but since the transit-duties abolition, bread-corn is now supplied so cheaply from the interior, that no person would find it worth his while to cultivate a crop so tedious in ripening, when he can purchase good imported wheat at the rate of less than one anna for two lbs.

43. I find (*vide Medical Topography of Dacca*) that forty years ago the root was introduced there in the hope that it would prove a staff of life to the numerous population of that city, but the experiment did not succeed. The preparation of tapioca from the root as an export for medicinal and culinary purposes in England, has attracted some attention in Calcutta, but this can hardly form an appreciable item in the resources of a great country like India.

44. *Indian Corn*—should have been noticed among the *Cerealea*. That brought out by the American planters, seemed hardly superior to our indigenous product. It is now under increase. A quantity re-

ceived from the India House, per the June Steamer, was sown, and will ripen in three weeks. The varieties sent were the most splendid, as to size and colour, which I have ever seen. Should they not degenerate, they will be found well worthy of extensive distribution, and will, I have not the least doubt, be eagerly sought after.

45. *Arnatto*.—This dye seed, the produce of the *Bixa orellana*, grows well with us. I had not anticipated any indigenous market for it, but last season it was eagerly bought up, at three lbs. per rupee, by dealers from Poonah. I do not know the probable extent of the demand, but mean to increase the cultivation in order to meet it.

The tree, I believe, grows well in the Carnatic provinces, but is hardly known here.

46. *Madder*.—We find that this plant grows even with weedy luxuriance, but I have not yet gathered a sufficient quantity of the root to submit it for judgment in Bombay. From appearance I would judge, that it may be found deficient in colouring matter as compared with the root of the Mediterranean.

47. We have a wild species (*Rubia Cordifolia*) common on the very high hills, as Hurrychunder and Mahabuleshwar. Its root also affords colour.

48. *Tobacco*.—has been grown pretty extensively from choice Syrian seed. The quality of prepared leaf has been, by judges in Bombay, pronounced inferior; but with every respect for this authority, I deem it in flavour quite equal to the best Persian.

Another trial will be made this season by manuring the ground, in order to increase the strength of the flavour.

49. *Coffee*.—I have on three occasions been liberally supplied with coffee seed by Government. Further supplies will not be required, as I now raise plants in abundance from seed produced in the garden at Hewra.

At Dapoorie this tree (like many others) will not produce fruit.

I have at present about three hundred young plants here nearly ready for distribution.

The produce of the five year-old trees is not any thing very encouraging as to quantity, though as to quality first-rate.

50. I deem it hopeless to expect that our irrigated and artificially shaded coffee trees can ever produce an article qualified to compete with that of countries having their area as yet consisting chiefly of uncleared virgin soil; and, moreover, it is demonstratively true that the prices of coffee must, owing to daily extending competition, not met by equally extending consumption, fall to a great extent. Should a

change of habits on the part of our population beget an extension of tastes, and among them a taste for coffee, there is no reason why in many villages the tree might not become a common and ornamental appendage to the cottagers' dwellings; and in *this point of view*, it may be worth while to keep up the cultivation of the tree.

A joint stock company, were it to engage in the cultivation, would do so with the certainty of loss.

51. *Tea*.—This first experiment made with tea in the Deccan, turned out (as might have been expected) a complete failure.

52. Lately we have been favoured by Government with an importation of the Assam Tea Plant, of which forty-three reached us alive.

53. It does not appear to me that we have either analogy or experience as a ground for hope that the plant will suit the climate of the open plains of the Deccan, though in some few localities it may be *preserved alive*; neither do I see that we gain much by attempting (at an undoubted expense) to naturalize, within our own presidency, the growth of a production which we can always have from Bengal or China at reasonable rates in the natural exchange of commodities.

54. If the plant will succeed anywhere within our limits, it will probably be in valleys above and close to the Ghauts, in places well sheltered from the violence of the S. W. monsoon. At Mahabuleshwar I was pleased to observe in May last that the tea plants, though showing no exuberance of leaf likely to reward the merchant, had yet grown to the height of above 3½ feet. These have been planted, I think, about nine years, in what was the station garden (now a potato ground) completely sheltered from the S. W. wind, but having the vale open to the rivers and streams in the lower dells, so that throughout the year, they must enjoy a moist climate.

55. Localities in Kandesb, about the Nerbudda, and other places, have been suggested as eligible places for exotics; but the heat in all those places in the hot season is very considerably greater than that of the Deccan, so that tea plants could have no chance there. I cannot say if the climate, so high up as Omercunthe, might be more eligible, as I have not sufficient local knowledge to offer an opinion.

56. *Grass Seeds*.—Quantities of grass seed, of varied and choice descriptions, have been supplied to us from the India House, in the view of their increasing the supply of food for cattle. Of these a large portion has been sent to Mahabuleshwar for trial there. In the open country I do not see a chance that they can be raised or kept alive without artificial irrigation, so that their extension on mountain and barren lands in this latitude I hold to be physically impossible; while

in the better class of soils of the Deccan and Guzerat, we have abundance of fine natural grasses, besides the large quantity which is artificially raised in the hot season, as food for cattle. This consists of millett and Indian corn as thickly sown as possible, in order to secure a long and succulent stalk at the expense of the ear.

57. It is a standing crop in all well-circumstanced villages, and without it the cattle must, and do, perish in great numbers in any season when the rains are, as in the present year, late in commencing. It has in many instances this year sold so high as rupees 100 per beega, the common price in a good one, being from 20 to 50 rupees.

58. *Guinea Grass*.—This is, I believe, the staple food for cattle in the West Indies, where it is grown without irrigation on the hills, &c. In this climate it does not at all succeed without irrigation.

59. I have tried it on the hills near streams, and found it a failure. Many parts of the Concan might suit: I mean those low moist spots which the eye can detect even in the hot season.

60. *Lucerne*.—The Kelat lucerne, of which a large quantity was furnished by Government six months ago, has been partly sown and partly distributed. It has vegetated well, but I fail to detect the smallest difference between it and our Deccan species. Its superior luxuriance at Kelat, &c., must be owing to climate rather than to species.

61. *Vegetable Seeds*.—Of these a variety of supplies have, at different times, been forwarded from the India House; among them are many new and valuable kinds. The Russian cucumber, lately received, promises to be a very valuable addition to our list of esculents, from its being so very prolific. It may now be seen in full growth at Hewra. The varieties of peas and beans also are of great promise.

62. *Fruit Trees and Ornamental Shrubs and Plants*.—Of these, we have been able to add very considerably to those already in the Gardens, chiefly through the liberality of Messrs. Loddiges & Co. of Hackney, and the indefatigable exertions of Colonel G. R. Jervis, Bombay Engineers, who, while in England, lost no single opportunity of forwarding plants free of expense. In this way dispatches of trees, which in carriage alone must, had they not come by private hands, have cost several hundred pounds, have been conveyed to the Gardens for the mere charge of bringing them from Bombay.

63. Among these I may enumerate—1st. the Olive of three species; the broad leaved, the redoute, and box-leaved—of the two latter many have been planted out, and at Hewra is one 10 feet high. At the latter place they are all most flourishing; at Dapoorie somewhat poor from quality of soil, I believe I will have to transfer them. 2d. Cedar,

one tree, flourishing; 3d, Kye apple, flourishing; 4th Zizyphus Bonariensis, ditto; 5th, Arancarias, 3 species, ditto; 6th Fuchsias, 4 species, sickly; 7th, Camellias, 5 ditto, healthy; 8th, Magnolias, 5 ditto, sickly; 7th, Anona Cherinulya, 1, tender; 8th, Star apple, 1, strong and healthy; 9th, Mahogany, 1, healthy; besides a variety of smaller plants and bulbs, many Cactuses, blood red Malta Orange, several flourishing trees, and about 40 species of rare Orchideous Epidendia from the dense forests of Demerara, Surinam, &c.

64. To Dr. Royle we also are indebted for various trees from Brazilian and American seed, names not yet ascertained, as the packets had no superscription; also for Gleditschia Triacanthos, 2 Philadelphey, numerous seedling Cypress trees of 3 species, a maple, many pines, &c. &c., and a great number of the beautiful annuals of California; Rhododendra, of which supplies have frequently been sent, have uniformly died off after vegetation; the same fate has attended cuttings of fruit trees also sent by Dr. R.

65. To this source also are we indebted for the Tansy, and for the Hop, which, however, is too sickly to allow a thought of its flourishing in this latitude. I have one plant, a seedling.

66. To Dr. Wallich we owe the Prinsepia Utilis, and some other valuable trees.

67. To Dr. Falconer, Seharunpore, several valuable forest trees, new to this presidency.

68. To Dr. Lush many flourishing trees of Schinus Molle, a medicinal tree of South America. To the late Dr. Heddle, the Voicinia Regia. To Mr. Nimmo, a most valuable tree, the Sennaar Ebony.

69. The seeds of the Himaleh Walnut, forwarded by Government two years ago, are now (many of them) flourishing young trees.

70. The Abyssinian seeds very lately forwarded by Government, have already vegetated, and it is likely that we may get from them some forms of vegetable life new to science.

71. With respect to the importation of valuable exotic trees, which we receive in exchange for plants sent from this country, it is to be lamented that so much uncertainty should prevail in the Post Office arrangements as to forwarding parcels from this country. One package, franked by Government, as per Mr. Boyd's letter, No. 2866 of 1838, was charged postage upwards of £104. The person to whom it was addressed, had the greatest difficulty in getting over £100 of the charge. The remaining £4 he could not get relieved from.

71. One package, a case containing most valuable plants for Messrs. Loddiges & Co., respecting which a reference was made to Government,

in July or August 1841, and which was finally forwarded by Captain Oliver, Superintendent of Indian Navy, per steamer of September 1st, never reached its destination at all, having probably attracted the attention of some *amateur* on its route.

73. One small box of very rare Indian plants, the conveyance of which was kindly undertaken by two private friends, passengers—reached London, charged with a postage of £18 18s., and was of course refused. I mention these things as illustrations of the difficulties which beset us in efficiently carrying out the great measure of an active interchange of the productions of this country for those of Europe and America.

74. *Indigenous Timber and Forest Trees.*—We have gone on annually increasing the variety of these, both with the view of concentrating under the eye of the scientific traveller who may happen to visit this country, the varied forms of our forests, and of testing the value of different trees, as to rapidity of growth, value of the wood, medicinal properties, or other useful qualities. And thirdly, with the view of forming a *depôt*, from which trees or tree seeds, warranted ripe and fresh, can be distributed to different parts of the country.

75. Several gentlemen have materially forwarded this object by collecting and sending annual supplies of seeds. It were to be wished that the spirit of sending occasional contributions were more general throughout the services.

76. Natives not unfrequently ask for trees to be planted near their wells; but as yet these demands have been confined to Teak, Oranges, Cypress and Guavas; and of Shrubs, to the Red and White Rose, and to the Annoto tree seed.

77. The Indian-Rubber Fig has been largely increased here, as several natives have expressed a wish to have trees of it, from the beauty of its leaf and its affinity to their own war-tree *Ficus Indica*.

78. I mentioned above, that trees for which the air of the plains is found not to be suited, are removed by me to the Hill Fort of Sewnere. By the labour of the four Chinamen (convicts) furnished to me in January last by order of Government, the hill is assuming quite a new aspect, and the vegetable gardens, which I have allowed them to form for themselves are, as is usually the case with the works of this people, models of neatness. I could wish that we had twenty such men employed at Dapoorie; I would undertake to hut them, and to pay the expense of guarding them from the Garden funds. They would do much to set an example of neat and careful gardening—an art which none of the Deccan people are up to,—while, by the plan I propose, no extra expense would be incurred.

79. While on the subject of trees, I may mention the *Ceratoria alba*, or St. John's Bread, respecting which ; viz. the possibility of diffusing it extensively over the country, a reference was some time ago made to me by Government. Since then, I have carefully watched the growth and habit of those trees in the garden here, and in respect of neither of these is the result encouraging. They appear to require shelter and constant care. In as far, then, as I yet see, I have no reason to recommend that expense be incurred for its extension. In relation to this subject generally, I observed lately in the *Bombay Times* an article, calling the attention of Government and of the public in general, to the practicability of introducing European timber to supply the place of native woods in house-building, &c.* The writer could not have been aware that in this country we have a vast variety of woods differing in hardness, durability, and value, and that most of these woods are applied for building purposes, according to the means of the builder ; neither could he have been aware how peculiarly perishable the best Pine timber is in this climate, nor how very delicate, stunted, and sickly, Fir trees of all sorts continue in this latitude. I only notice the subject now, as it may save me the necessity of answering a reference hereafter ; though I confess I do not deem it probable that Government could ever sanction a plan so certainly expensive, and so little likely to be satisfactory in its results. I am very far from wishing, by the above remarks, to be understood as wishing to damp any efforts which may be made to introduce new trees, and thus increasing the variety of our vegetable world, and more specially those which have useful properties.

80. *Oil Plants, &c.*—On this head I may remark, that the *Madia sativa*, of which seeds were brought out by Dr. Lush, has been exten-

* Dr. Gibson must have entirely forgotten the drift of the article in question—which appeared in the *Bombay Times* of July 27, 1842. It contains not the slightest allusion to the introduction of European Timber into India, muchless does it say anything about the preference of pine as applicable here to building purposes. The object of the writer apparently is to shew, that were experiments made in Western India on the growth of exotic forest trees from any part of the world, it was probable that timber more economical in house building might be found than that at present in use. The only allusion to pine, or to the woods of Europe at all, is given by way of illustration—to show that if certain ends of much importance have been attained elsewhere, certain other ends worthy of being sought after might probably be found attainable at Bombay. Dr. Gibson in writing, most likely without referring to the article, had probably retained on his mind an erroneous impression of the drift of the following remarks.—“The best illustration that presents itself on the present subject is the introduction of Larch trees from Switzerland into Great Britain. About a century since they were brought as flowering shrubs to Monzie and Dunkeld, in Perthshire, &c.”—EDITOR AGRI-HORT. SOCIETY'S TRANSACTIONS

sively tried both at Hewra and at Dapoorie as a rain's-crop, as well as a crop of the cold season.

It does not appear to suit this climate. While beginning to flower, a great part of the plant becomes blighted and dead. This affects so materially both the quantity and the quality of the seed, that I do not conceive it likely ever to afford a remunerating return, or even to repay the expenses of its cultivation; but we have an indigenous edible oil, probably quite as good; viz., that of the *Archis hypogæa* or Ground nut, which oil, I am happy to see, is most favourably noticed in the Bengal Dispensatory, p. 304. This oil I can, from experience recommend as a salad oil, very superior to the Olive oil commonly sold in this country, and quite equal to the Oil of Poppy seed; but of this oil I trust to have more to say by and bye, as the oil-press on Bramah's principle, lately set up here, is not yet in full work,—a first trial having only been made some days ago, and that with castor-oil seed. As far as I have yet seen, the promise of its perfect efficiency is very favourable; but I hope shortly to submit (according to order) a detailed report of results with different seeds.

81. *Buildings, Establishments, &c.*—Since last report two plant houses, intended for valuable exotics, have been built on a substantial scale,—one at Dapoorie and one at Hewra;—various other improvements have been made, calculated to increase the efficiency of the gardens; and further enlargement of garden offices, is at present in progress, as an increase of store-rooms is urgently required. These measures, however, have caused no extra charge to be made on Government, nor will they do so, as the whole is defrayed by the proceeds of the gardens. I should also mention, that of the land made over to me by Government in 1838 for garden purposes,—viz. the Government land at Belsur,—I have reserved only a small portion for garden use, and made the remainder over to the Collector's Department for rent by auction sale, as before; and that, owing to the increased value which circumstances have given to the land at this place, the last sale realized Rupees 107 for about $4\frac{1}{2}$ acres, on a three years' lease, making the amount (inclusive of Mr. Dickinson's holding) Rupees 122 per annum, and the annual payment per acre nearly Rupees 24; while the adjacent meeras land of equal quality pays an assessment of about Rupees $3\frac{1}{2}$ per acre.

My reason for again making over this larger portion to the Revenue department was, its being unfitted, owing to liability of river-overflow, for the growth of trees: and moreover, I felt desirous of ascertaining

whether the extended cultivation of the potatoe and sugar-cane at that village had affected the value of land.

(Signed

ALEX. GIBSON,

Superintendent Botanical Garden.

GOVERNMENT GARDEN, HEWRA,

13th August, 1842.

[From the 2d number of the Transactions of the Agri-Horticultural Society of Western India, July, 1843.]

Notes on the Botany of H. M. Discovery Ships Erebus and Terror in the Antarctic voyage; with some account of the Tussac Grass of the Falkland Islands.

(Continued from page, 241)

“ In spite, too, of the hundred degrees of latitude which sever this island from Europe, there are many points in which their botanical productions resemble each other, as numerous examples will prove.

“ The gigantic Grass (*Festuca Flabellata*, commonly called *Tussac*) which covers three-fourths of the Isle of Penguins, and all the sandy dunes of the Bay of La Soledad, and whose enormous tufts look at a distance, like a thick-set copsewood, has much affinity with our *Dactylis*. On the same dunes grow *Apium graveolens*, *Statice cæspitosa*, *Triticum junceum* (.) and *Lolium perenne*. The *Arundo pilosa*, *Avena redolens*, *Aira flexuosa* and *Festuca erecta* constitute, of themselves, an excellent pasturage of great fertility, and cover an extent of many miles. On first observing *Serastium vulgatum*, *Alsine media*, *Sagina procumbens*, *Senecio vulgaris*, *Veronica surpyllifolia*, and *Rumex Acetosella*, I inclined to the opinion that they were imported by man; but, afterwards, the great profusion and distance from cultivated spots at which they grow, made me consider them indigenous; for it is hard to believe that winds or birds can have transported the seeds; and these European plants were moreover, almost all seen by Commerson about the Straits of Magelhaens, nearly fifty years ago, with the addition of *Cardamine hirsuta*, *Thlaspi Bursa pastoris*, and *Primula farinosa*.

“ Many of the most prevalent European genera are represented in these islands by species which strongly resemble those of the Old World; and of the eighty genera of plants which constitute the

Flora, there are only between fifteen and twenty which are not common to the European continent. These are *Creobolus*, *Gaimarda*, *Astelia*, *Callizene*, *Sisyrinchium*, *Drapetes*, *Nanodea*, *Calceolaria*, *Nassauvia*, *Baccharis*, *Perdicium*, *Oligosporus*, *Chilicium*, *Nerteria*, *Azorella* and *Misandra*. In a word, the affinity is so considerable that I should almost think a botanist would feel himself more strange if transported suddenly from Morbihan to the shores of the Var, than if set down on the Malouine Islands. Nature, so fertile and varied under the Equator, becomes more uniform in northern regions, and having apparently lavished all her types on the vegetation of the tropics, is reduced, so to speak, to assign similar genera to the most widely-severed portions of our globe.

“ The majority of plants, inhabiting the Malouines have been found also by Commerson, near the Straits of Magelhaens; and by Forster on Tierra del Fuego; thus leading to the supposition that these islands once formed a portion of the great South American continent. The soil is everywhere turfy below, and so spongy as to imbibe moisture with great rapidity and leave the grassy surface dry. This turf is much thicker in the interior than near the sea-shore, and has frequently such abrupt perpendicular edges as resemble the work of man. These natural ramparts are not uncommon on the high grounds, often rising to an elevation of 4 or 5 feet above the surrounding land, and their formation is a subject of difficult explanation. They afford a most desirable shelter from the winds to the numerous herds of wild horses. Streams of fresh and pure water everywhere intersect the islands; and though they are marshy at the brink, the close and firm nature of the vegetation prevents the earth from being seen, or the feet of the traveller from sinking. There are fine lakes in the plains, and basins of water on the very summit of the mountains. Water is everywhere abundant; but most of the plants are of a resinous nature, or furnished with a varnished surface, which protects them from the effects of so much wet. The dry nature of the plants was shewn by the facility with which I preserved my specimens, notwithstanding the cold weather and the rains which never ceased to fall during the whole time of our anchorage at the Islands, between the 18th of Nov. and the 18th of Dec., corresponding with May and June of our hemisphere.

“ This residence was long enough to shew how fearful are the winds in these islands, and how admirably fitted the vegetable productions of the soil are to resist their violence. All those plants

whose stems rise a little above ground, are flexible, and bow beneath the blast, while the chief part are of lilliputian growth, and form such dense and interwoven masses, that the very soil must flee away in dust, ere they could quit their position. Nothing can be more singular than the enormous tufts of *Bolax*, which at first are no bigger than molehills; but, by the constant addition of new shoots, swell in all directions, and attain a height and breadth of some feet. A resinous and strong-smelling substance continually exudes from all parts of these plants, and is perceptible at a considerable distance. If carefully examined and analyzed, it is probable this gum might be found to possess some valuable properties."

M. d'Urville visited Mount Châtellux, 17 miles distant in a straight line from his ship. "Two days were devoted to this excursion, in each of which we walked for fifteen hours, and this long walk gave us a good opportunity of examining the nature of the island, the result of which was, that the farther you proceed inland, the less varied is the vegetation. Once past the dunes, marshes and rocks, which have each some peculiar plants, and the country stretches for miles in uniform plains, solely producing the three Grasses mentioned above, and a few thinly scattered tufts of the *Bolax*. When the ground rises again, the variety becomes greater, and on the summit of Mount Châtellux, I found almost all the species that had been seen in the lower situations, though reduced to half or a third of their usual dimensions; except, indeed, the *Bolax*, which grew as strong as elsewhere, though springing out of the entirely naked rock. Five plants alone appeared peculiar to these elevated spots; a beautiful *Aspidium* (*A. mohrioides*); the curious *Nassauvia serpens*; *Cenomyce vermicularis*, white as snow; and two minute plants which grow in the closest tufts, *Drapetes Moscoides*, originally found by Commerson in the Straits of Magelhaens, and a new *Valeriana*, which I named *sedifolia*. The beautiful *Lomaria Magellanica* is rare on the plains, but abounds among the courses of quartz stones that may be seen on the mountain sides; while *Usnea melanantha* carpets the surface of these huge blocks, with its fronds varied of yellow, fawn and black."

M. d'Urville increases the number of Falkland Island species to two hundred and seventeen, of which ninety-seven belong to *Cryptogamia*.

In 1841, Mr. Wright returned from a mercantile voyage to the Falkland Islands, where he very laudably employed his leisure time,

during the summer months, in making a beautiful collection, which was presented to me ;* among them are some species that had not been previously found on the Islands ; and still more recently, a few specimens, gathered there by Lieut. Robinson, and communicated to me by the Admiralty, afforded a *Hamadryas*, a very fine *Draba* and a *Gleichenia*, which appear to have been overlooked by all former collectors.

After these and other researches, it is hardly to be expected that much was left for the botanists of the "*Erebus* and *Terror*" to discover ; especially, seeing that their stay was almost wholly in the winter months. Yet, notwithstanding these disadvantages, the number of species of flowering plants, when the last intelligence came away, on the return of the expedition from Cape Horn, amounted to one hundred and seven, gathered by one individual. Of *Cryptogamia*, as may be supposed, there is a much greater proportion and many of them are extremely beautiful, and copious notes and drawings were made of both, which cannot fail to be of great value.

The "*Erebus* and *Terror*" came to anchor in Berkeley Sound, on the 5th of April, 1842, the commencement of winter. The purser went ashore and returned after nightfall, but was entreated to bring on board a specimen of some vegetable production of the country. He grappled in the dark, and obtained a plant of *Shepherd's Purse* ! " But," said the disappointed botanist who had made the request, " I hope for better things to-morrow." A letter, dated Berkeley Sound, East Falkland, August 28th, 1842, proceeds thus :

" Our stay in this Island has afforded me time for investigating its botany as fully as the wintry season and stormy weather will permit, and I would fain hope that little has escaped my notice. Some of my specimens are imperfect, owing to the time of year ; and I have only gathered such because they may yet be determined at home ; or if not, they may add one or two to certain *Natural Orders*, whose geographical distribution is a subject of much interest to me. Among the *Lichens* I have had a fine field here ; some of them, especially the rupicolous species, are particularly handsome.

" The collection ready for sending home, contains numerous specimens of every tribe of plants found in the Falklands, with the

* Several of the plants have been published in the 6th vol. of the *Icones Plantarum Rariorum*.

exception of the *Algæ*, which here attain gigantic dimensions. My notes are rather copious, both on the plants themselves, and their distribution in the various parts of the Island. All the plants enumerated by Gaudichaud as having been found by himself and others, have come under my notice, except three or four.

" *Mosses* are now, and only now, showing fructification; many of the species I have only found in a barren state, especially among the *Pleurocarpi*.

There are of *Andræa*, two sp. Of *Sphagnum*, one (or what might be called three). *Grimmia*, two, in fr. *Trichostomum*, our hoary friend (*T. canescens*), barren and very scarce. One *Orthotrichum*, resembling the Kerguelen's Island maritime species. *Didymodon*, two or three. *Dicranum*, two. *Campylopus*, one. *Tortula*, two. Three *Brya*, in fruit. *Funaria*. *Bartramia*, two, in fruit. *Polytrichum*, two, barren. Several *Hypna*, and two *Hookeria*, all barren. About ten species of *Jungermannia*, two *Marchantia*, and a *Riccia*. There are about thirty species of *Lichen*, and among these, *Usnea melaxantha*, which is quite different from the yellow Kerguelen's Island *Usnea*, being larger and more handsome; also some beautiful species of *Sticta* and *Roccella*, and several *Cladonia*.

" My *Sea-weeds* are not examined, and I shall send none of them home till I have done so. There are three species of *Macrocystis*, and several *Laminariæ*, here taking the place of the *Sargassu* of milder climates, some lovely *Florideæ* and the *Ballia*, one of the commonest sea-weeds here, and attaining a large size. I do not doubt its being the *Sphacelaria callitricha* of Agardh.

" *Marine Confervoid* species are abundant, many of the bays being covered with an odious-looking green slime, formed by one or two kinds. There are also several fresh-water species.

" *Fungi* are scarce. On our first arrival, two large *Agarics* and a yellow *Helvella* (?) were common, but I neglected to gather them, and when the cold weather set in, they immediately vanished. I have, however, requested my friend, Mr. Lyall, of the '*Terror*,' to collect them when the spring begins, at which time we shall be absent at Cape Horn, and I have provided him with a bottle of spirits for the purpose. The other *Fungi* are two small *Agarics*, a *Lycoperdon* and a *Peziza*.

Of *Ferns* I possess two *Lycopodia*, two *Steganiæ*, the *Hymenophyllum cæspitosum* (the smallest fern I ever saw), a handsome new *Aspidium*, very rare, and gathered last week in the stream of stones

described by Darwin, and a *Gleichenia*, kindly given me by the Assist-Surgeon of H.M.S. 'Arrow,' but which I have never seen alive.

"Since beginning this letter, I have taken a long walk to visit *Uranie Bay*, where the French navigator, Freycinet, lost his ship, 'L'Uranie.' Leaving our anchorage, I proceeded to the south end of the upper extremity of this harbour, along a slaty beach, overhung with low cliffs of clay-slate, covered with *Gunnera*, *Acæna*, *Oxalis enneaphylla*, *Cardamine glacialis*, *Nassauvia Gaudichadii*, *Homoianthus echinulatus*, with here and there bushes of *Empetrum rubrum* and *Chilliotrichum ameloides*, and many smaller plants, some of them maritime, as a fine *Statice*, a little *Psyllium*, and four or five curious forms of *Umbelliferae*, as the *Bolax*, which forms large overhanging semi-circular mounds, and the little *Azorella lycopodioides* and *filamentosa*, a new *Caldasia* and a most singular *Hydrocotyle* (?) with fistular simple linear leaves. The shore is covered with entangled masses of two species of *Macrocystis* and other *Sea-weeds*. A *Sticta*, one of the most beautiful of *Lichens*, forms large leafy patches among the *Grasses*, of several sorts, while the barren rocks are covered with *L. geographicus* a noble *Roccella*, sometimes nearly a foot long, and other fine *Lichens*, which completely whiten them where they are most exposed to the light.

"The holes and crevices are full of *Mosses* and *Jungermannia*, a *Riccia*, two *Hookeriæ*, two *Bartramia* and others. It has been the first fine day we have enjoyed for a long while, and the plants are just beginning to sprout. *Viola Magellanica* and the *Oxalis* are showing their leaves, and the tufts of grass look green at the base, especially the fine *Hierochloe* (?), of which the old leaves, drying in the sun, smell delightfully. The poor *Birds*, whose breeding-season has commenced, are revelling in the change of weather. The *Steamer-Ducks* flock along the water, so tame that any one may come within a yard, as they are pluming themselves and uttering their wheezing clack-clack, presenting a curious contrast to the restless shy *Black-black Gull*, which watches them from over-head, and whenever the poor *Duck*, after a dive, emerges with a fine sea-animal in his bill, this pirate *Gull* darts down and seizes the morsel, before the original captor has had time to draw his breath. Little *Sand-pipers* are running and chattering along, and every here and there, the beautiful *Kelp Goose*, with her spotless white *Gander*, appears

sitting on a rock, and picking choice specimens of *Algæ*. A smaller *Gull*, with black head and beautiful rose-coloured breast, has the habits of a *Tern*, perpetually screaming and suddenly dropping, with wings erect, on the water, with a little splash, to pick up some incautious shrimp.

"Leaving the beach, the upland grounds are low and flat, intersected by small valleys and slow streams, running deep in the boggy earth; the *Arundo Alopecurus*, forming an excellent pasturage for cattle, covers all the bogs, and the *Bolax* grows in large hassocks on the drier tracts. Here one has constant companions in the *Carracara Hawks (Polyborus)*, which follow the stranger everywhere, perching close by, upon the ground, frightening the poor rabbits out of their forms, and narrowly watching every motion. Nothing grows so high as the grass, though now and then tufts occur of the *Empetrum* and a little *Arbutus*, accompanied by *Cornicularia*, *Cenomyces* with red *pyridia*, *Cetraria*.

"The valleys, again, are full of bushes of *Chiliotrichum*, *Trichostomum lanuginosum*, *Sphagnum*, and a few other *Mosses*. Presently a *Snipe* gets up, or a flock of *Thrushes*, or the beautiful red-breasted *Starling* (?) twittering and chattering from bush to bush. The *Upland Geese* are pairing, and geese though they be, an experience of five months, during our stay here, has taught them to fly away, instead of sitting still to be shot at. The long creeks, which run up from the Bay, have their banks covered with slimy confervoid *Algæ*, and here the little *Teal* swim and whistle in flocks; while the *Black and White Oyster-catchers* keep poking their long red bills into the ooze; and busiest of all, the beautiful *Chionis* stands, scarcely heeding you, while the low water affords him a feeding-time.

"The hills are all quartz; and, wherever that formation presents itself, it may be recognised by the turf containing patches of the *Astelias*, *Caltha appendiculata*, *Oreobolus obtusangulus*, *Gaimarda australis* and *Myrtus Nummularia*. The fine *Stegania* grows only near quartz-rocks, which, though so dry and hard, are rendered perfectly beautiful by the *Usnea melanantha*, forming a mimic forest, accompanied by other foliaceous and crustaceous *Lichens*. 'Uranie Bay' is of sand, with sand-hills at the back, like the Denes of Yarmouth, in Norfolk; among these grows a fine *Grass*, with two beautiful *Senecios*, and large patches of a *Tortula*, like *ruralis*. It was among these hills that Freycinet encamped his crew, and a sketch, which I have copied from one that was done at the time by an English sailor

of the party, and which belongs to the Governor here, represents the scene. In Weddell's Voyage you will find some particulars of this disaster. The sand is of the purest snowy white, against which the sea appears of a brilliant blue. Large beds of *Kelp* cover the rocks outside, and have now hidden the wreck of the '*Ukraine*' of which no signs appear, but some copper and a few iron water casks on the beach.

"At the back of the sand-hills are several pools of water, in which I gathered Gaudichaud's *Limosella* and *Myriophyllum*, but though I have been hunting ever since I came here for the *Azolla*, in similar situations, not a trace of it has met my eyes. On the beach lie huge trunks of *Sea-weeds*, perhaps the *D'Urvillea*, branched like a tree; sometimes a foot in diameter and often 12-14 feet long. A horizontal section of the stem presents oval concentric rings, answering to successive periods of its growth. These rings are composed of cells, containing a viscid fluid, which evaporates as the trunks dry up, till these, shrinking excessively, become harder than horn. It is singular that the *Usnea*, perhaps the largest form among *Lichens*, presents a still more striking analogy to *exogenous vegetation*; so remarkable that I think it must be noticed somewhere. A horizontal section of any of its stems or larger branches, exhibits a distinct cortical layer, of a yellow colour, and coriaceous consistency, loosely attached to an inner corky layer, which sends medullary rays through a hard red horny axis, to meet a central corky pith. Except that these layers are all separate forms of cellular tissue, they are, in every respect, analogous to the *Bark*, *Wood*, and *Pith* of a tree. I think that the red horny tissue expands over the *excipulus* of the thallus, and gives off the *peridium*."—*From the London Journal of Botany, for June, 1843.*

(To be concluded in the next number).

Monthly Proceedings of the Society.

(Wednesday, the 12th of July, 1843.)

The Honorable Sir J. P. Grant, President, in the Chair.

MEMBERS ELECTED.

The Gentlemen proposed at the last meeting were elected members of the Society; viz.

Messrs. F. Gouldsbury, John Hampton, F., J. Morris, Major General Cartwright, and Captain S. B. Goad.

Candidate for Election.

T. F. Henley, Esq. Merchant, Calcutta, was proposed as a member by the Secretary, seconded by Mr. W. Storm.

PRESENTATIONS TO THE LIBRARY.

1.—Seventh Report of the London East India and China Association.—*Presented by the Association.*

2.—The Planters' Journal, No. 49, 50 and 51.—*Presented by the Proprietor.*

3.—Extrait des Seances de la Societe Royale d'Agriculture et de Commerce de Caen, 1842.—*Presented by the Society.*

4.—The India Journal of Medical and Physical Science, No. 6 of vol. 1.—*Presented by the Proprietor.*

5.—The Calcutta Literary Gleaner, No. 5 of vol. 2.—*Presented by the Proprietor.*

6.—Paxton's Botanical Dictionary—Keith's Botany (2 vols) and Magazine of Science, vols. 1 and 2.—*Purchased by the Society.*

MUSEUM.

1. Fifty-one varieties of Wheat, and sixteen varieties of Barle from the Highland Society of Scotland.—*Forwarded by Dr. Royle, by the May Overland Mail, from the India House.*

In his note accompanying these specimens, Dr. Royle expresses a hope, that they may be suitable to some parts of India. He further mentions, that Dr. Gibson has found some to succeed well at Bombay.

The Secretary was directed to distribute this assortment to such members as are likely to give the grain a fair experiment, and favor the Society with the result.

2. A quantity of Strawberry seed from the Branch Society's garden at Lucknow.—*Forwarded by Capt. G. E. Hollings.*

Captain Hollings mentions, that this seed was prepared by the Hon'ble Captain Powys, Brigade Major to the troops in Oude, who, in this, as in several other instances, has obligingly rendered a ready compliance with his wishes.

3. A maund of Ceylon Seed Coffee.—*Presented by the Hon'ble Mr. Anstruther.*

The best thanks of the Society were given to Capt. Hollings and Mr. Anstruther, for their kindness in forwarding the above. (The seeds are ready for distribution.)

4. Three plants of a superior description of sweet Potato, and a few seeds of a large variety of Dhall.—*Presented by Mr. T. F. Henley.*

Mr. Henley presents these plants, under the impression that their introduction into India, may be well worthy the attention of the Society.

The Potato, Mr. Henley observes, has nearly superseded all other varieties in Mauritius, where the culture of such plants is of more importance, and more attended to, than, he believes it to be in this country. Mr. Henley states, that the roots attain a much greater size, frequently 5lbs. each, and are also much more farinaceous and nutritive than the varieties formerly cultivated at Mauritius.

Mr. Henley adds, that he believes the Lentil or Dhall, of which he presents a few seeds, does not exist in Bengal, although so many plants of this family are already known and cultivated in this country. The variety in question, Mr. Henley describes, as an excellent bearer; it is a low and bushy plant like the common gram, and is very hardy as an article of food; it is much liked by Native Indians in Mauritius, and consumed as Dhall.

The plants were transferred to the Society's garden.

5. Samples, in different stages, of a varieties of Caoutchouc, termed *Gutta Percha*, the production of a large forest tree indigenous to Singapore and the neighbouring countries.—*Exhibited by Dr. Mouat.*

6. Sample of Assam Caoutchouc.—*Exhibited by Dr. Mouat.*

[For a short notice regarding these samples, see body of the Proceedings.]

Correspondence with Government relative to the publication of official Agricultural Papers in the Society's Journal.

The Secretary opened the business of the meeting by submitting the following correspondence with Government, which had taken place, in accordance with the resolution passed at the last general meeting :—

TO F. J. HALLIDAY, ESQ.

Secy. to the Govt. of Bengal.

SIR,—In compliance with instructions received from the Agricultural and Horticultural Society, I have the honor to annex extract from the proceedings of that body at a general meeting held on the 14th instant, and to solicit the favor of your submitting the same to the Hon'ble the President in Council.

2d. In forwarding this extract, permit me to observe, that while the Society is fully sensible of, and grateful for the assistance it has already received from the Government of Bengal, by the presentation, among other papers, in the year 1837, of those highly interesting and valuable communications, on the Agricultural and Rural Economy of Nepaul by Dr. A. Campbell, and on the Tea Plant of Assam, by Messrs. Griffith and McClelland, which have been published in the 4th and 5th volumes of its Transactions,—and while it conceives that the donation of such valuable documents, is of itself a proof that its endeavors to carry out the objects for which the Society was instituted, have been duly appreciated by Government, yet it trusts the present may not be deemed an unfitting period, for a respectful application to Government, for a renewal of such assistance.

3rd. His Honor the President in Council may perhaps be aware, that during the past year, the Society considered it advisable to adopt a Journal, appearing in monthly numbers, in lieu of the previous somewhat tardy mode of giving publicity to its papers and proceedings by the issue of an annual volume of Transactions. From the period of its commencement to the present time, the Monthly Journal has been mostly supported by contributions from members and correspondents of the Society. The Society however conceives, that if (without encroaching on the claims of other public bodies) the Government will be pleased to permit its Journal to be

the medium of communication on subjects connected with the agriculture of the country, or, in other words, if the Government will place at the disposal of the Society, such papers bearing on the agricultural resources and capabilities of India, as may from time to time be received from its Officers, it would not only tend to add greatly to the value of the Journal, but would be the means of diffusing widely much useful information; for I may add, that independent of the forty copies which are regularly furnished for the use of Government, as requested, upwards of five hundred copies are transmitted over various parts of the Indian Empire, to the members and correspondents of the Society.

I have the honor, &c.

(Signed) JAMES HUME,
Hon'y. Sec.

TO JAMES HUME, ESQ.

Secretary Agricultural and Horticultural Society.

SIR,—I am directed to acknowledge the receipt of your letter dated the 22d instant, and in reply to inform you, that the Deputy Governor of Bengal is fully sensible of the public benefits that may be expected to arise from the publication of interesting official reports on Agricultural subjects in the Journal of the Society, and will be most happy to comply with the wishes of the Society in this respect, whenever it may be in his power.

I am, &c.

(Signed) CECIL BEADON,
Under Sec. to the Govt. of Bengal.

Fort William, 26th June, 1843.

Correspondence relative to a remarkable variety of Caoutchouc, obtained at Singapore.—Remarks on sample of Assam Caoutchouc.

A very interesting correspondence relative to a remarkable variety of Caoutchouc, termed *Gutta Percha*, or *Gutta Tuban*, was next read. These papers, which were submitted by Dr. Mouat, by permission, and on the part of the Medical Board, consist of a communication from Dr. W. Montgomerie, Senior Surgeon at Singapore, to the Medical Board, forwarding specimens of the substance in question, with a detail of its properties, and the probable uses to which it may be applied;—a letter from the Officiating Secretary Medical Board to Dr. Mouat, submitting the specimens for his examination,

and a communication from Dr Mouat, to the Secretary of the Agricultural Society, giving the result of his experimental observations as to the chemical nature, &c. of the Caoutchouc.

Dr. Mouat states, that, from an extended series of experiments, he imagines the substance to be a variety of Caoutchouc possessing some properties differing from those of the ordinary kind found in the market. He then gives the result of several experiments on the gum, and the various acids, oils, &c., in which it is soluble. This is followed by a description of the different samples which accompany the correspondence, and by remarks on the advantage it possesses in not being affected by the ordinary heat and moisture of the climate of this country.

Dr. Mouat concludes his valuable communication with the following observations :—

“ I shall be glad to know from any members of the Society familiar with the subject, whether the present is altogether a new variety, or one previously known in commerce, and whether it is identical with any found on the continent of India. I should also feel much obliged by being favored with specimens of the different kinds sold in the Bazars, and if possible, the fruit and inflorescence of the trees from which they were extracted, with a view to their identification.”

The best thanks of the Society were given to the Medical Board for the presentation of the above papers, and to Dr. Mouat for bringing this interesting subject to its notice. The correspondence was transferred to the Committee of Papers.

In connection with the foregoing subject, Dr. Mouat exhibited to the meeting a very superior specimen of prepared Assam Caoutchouc which had just been received from Major Jenkins, who states, that it has been kept for three years in the Province. It is in an excellent state of preservation, and appears to be superior to most of the ordinary masses of the Indian Rubber sent from England for stationary purposes, being much less clammy and adhesive. An extract from Major Jenkins' note was read, to the effect, that precise information as to the proper mode of preparing Caoutchouc, so as to compete with the Brazilian and other South American varieties sent to the European market, was still required, and would be a valuable boon to the Province, where the experiment had failed, more from the want of this essential knowledge, than from any inferiority in the article itself.

The Secretary informed the members, that all the information possessed by the Society on the subject alluded to in the above note,

had been incorporated in the fourth and fifth volumes of its transactions, copies of which were long since forwarded to Major Jenkins. As illustrative of Major Jenkins' remark, he might mention, that of the many specimens of Assam and other Caoutchouc, the produce of British India, which had been submitted to the Society during the last six years, not one had been found to be sufficiently well prepared to resist the effects of the damp and heat of the climate.

Experiment with Scotch Turnips at Bolundshahur.

The Secretary stated, that it might be in the recollection of the members, that through the kindness of Dr. Royle, the Society was put in possession, in the early part of last year, of a small but excellent assortment of seeds of Field Turnips, most generally esteemed in Scotland. The collection was transmitted by the overland mail, and reached its destination in the month of May; and on its receipt, no time was lost in distributing the seed over various parts of the country. He had now the pleasure to submit the following extract of a letter on the subject, with which he had been favoured by Mr. Tonnochy, at Bolundshahur:—

“I beg to notice a singular fact regarding seven kinds of Highland Turnip seed with which the late Dr. Spry supplied me. Having arrived in full time, they were duly sown, quickly came up, and produced as fine turnips as could be desired. In process of time the country turnips all went out, but I should have said, that along with the country, I transplanted the Scottish turnip for seed, cutting off as is done here, the tuft and bottom. The Scottish however continued flourishing on, and I congratulated myself with, comparatively speaking, possessing so permanent an article of green food for Sheep and Cattle; but I now find that the turnip, without shewing any sign of the seed stalk, is withering away; that is, its leaves, its root having in the mean time run to a considerable size. I know not what hopes can be entertained at this time of the year of their producing seed; but if they do not, the article will pass away altogether from me. I wonder what can be the cause of its not producing seed, it cannot be the transplantation and the cutting off the top and bottom, for the turnips that remained in their original beds are precisely in the same condition. Can it be that the Scottish turnip should be sown in a different season in this country?”

On the proposition of the Hon'ble the President, the Secretary was directed to address other members of the Society who had received

portions of this seed, with a view of procuring every information on the result of their experiments to compare with that of Mr. Tonnochy.

Report on Arrow Root from Beerbhoom and Lucknow.

A Report on the samples of Arrow Root which were presented at the last meeting by Captain Hollings and Baboo Sumboochunder Ghose, was next submitted. The Secretary mentioned that the Society was indebted to Dr. Mouat for the following opinion :—

“ I have examined the specimen of Arrow Root submitted to me at the last meeting of the Society, of which the following is a short report :—

No. 1. Prepared by *Sumboochunder Ghose and Co.*, appears to be of excellent quality, well prepared and dried, without any disagreeable odour or flavour. It forms a good jelly, and I consider it well adapted for all the purposes to which this mild and nutritious substance is applied.

2d. A muster from the Branch Agricultural Society's Garden at Lucknow, requires a good deal more care and attention in the preparation, before it can become an article of commerce, or compete with the better kinds found in the Calcutta market. It has a disagreeable smell, is not sufficiently washed and dried, contains insoluble matter, and would not keep for any length of time, without injury to its flavour and nutritious qualities.”

Carolina Paddy.

The Secretary informed the meeting, that in pursuance of the resolution of the last meeting, he had placed himself in communication with Messrs. Haworth and Hardman of this city, with a view to obtain, through the influence of their correspondents at Liverpool, a supply of Carolina Paddy, to reach the Society not later than the early part of April next. He had the pleasure to mention that Mr. Haworth, in a letter which he now begged to submit, had obligingly undertaken to endeavor to meet this request, for he states, “ You may depend upon the exertions of our friends to meet the wishes of the Society. Along with the Society's order, I have requested a considerable quantity may be sent for our own use. That we had out last year, came to hand too late, and we only got a small portion of it sown; the yield in *quantity* we considered small, but the *quality* was splendid, we had it cleaned by our machinery, and shipped

to England." Mr. Haworth adds, that he expects a report on the grain by the next mail, which he will submit to the Society.

Arrear of Subscriptions.

The Finance Committee submitted a memorandum of the names of five members, three of whom had resigned without paying up their arrears, and two were considerably in arrear with their subscription, notwithstanding that repeated applications had been made to them.

It was resolved,—That another application be made to these gentlemen, and if necessary, their names be then published as defaulters.

Communications on Various Subjects.

1. From Capt. G. E. Hollings, dated June 22d, giving in addition to his former report, some further information regarding the fruit trees which are under cultivation at the Garden of the Branch Society at Lucknow.

Capt. Hollings most obligingly offers to give the Society an English translation of a Journal which has been regularly kept in the Lucknow garden, shewing the time of blossoming, setting, and ripening of fruit, sowing and gathering vegetables, nature and quantity of manure, time and method of pruning, &c. &c.

2. From Dr. Mouat, presenting a statement of meteorological and thermometrical observations, registered during twenty three years at Chinsurah, by Mr. Herklots, which had been kindly placed at his disposal by that gentleman.

3. From Dr. Mouat, requesting the assistance of the Society to procure for him information relative to the Gums and Gum Resins found in different parts of India. Dr. Mouat observes, that as many of these gums are little known, and some may prove useful and valuable articles both for medicinal and commercial purposes, it will be most desirable to get further information regarding them, accompanied by specimens of the gums, with the flower and fruit of the plants, with a view of identifying the real source of production.

4. An extract of a letter from Lieut. Col. J. R. Ouseley, was also read. Col. Ouseley draws the attention of the Society to the great advantages that might result from the formation of a road through the Nurbudda valley and Candeish, on to Bombay, in continuation of the present fine road from Mirzapore to Jubbulpore. Col. Ouseley enters in detail, on the feasibility not only of accomplishing this object, but of converting the present road from Mirzapore to Jub-

Bulpore and from Jubbulpore to Calcutta, into a rail road, at a comparative small expense. Col. Ouseley concludes this portion of his letter by stating, that he conceives a matter of such importance deserves to be prominently brought to the notice of the Government.

All the above communications were transferred to the Committee of Papers.

5. From T. R. Davidson, Esq. Secy. to the Govt. of India, Revenue Department, dated the 24th May 1843, intimating the wish of the Right Hon'ble the Governor General, to take advantage of the offer of the Society for a supply of North American Cotton seed, and requesting that it may be forwarded to Agra.

The Secretary intimated that a large supply, consisting of ten barrels of seed, had been transmitted last month by water, and a further quantity by banghy.

6. From A. Rogers, Esq., intimating, in reply to an application from the Secretary, that he has a large quantity of acclimated English linseed on hand, which is available at six rupees per maund. It was agreed, that a few maunds be taken, to meet the demands on the Society.

For all the foregoing presentations and communications, the thanks of the Society were accorded.

Correspondence and Selections.

COTTON CULTIVATION AT COIMBATORE.

Extract of a Letter from Dr. ROBERT WIGHT, Superintendent, Government Cotton Farms at Coimbatore, dated 3rd August, 1843.

In my note of the 14th July,* I think I mentioned that I enclosed a Memo. explanatory of the marks on the bags of Cotton seed forwarded to your address. After the dispatch of the letter, I found the memo. still on my table; I have now the pleasure to enclose it, and hope it will arrive in time to prevent any mistakes. The bags marked $\begin{smallmatrix} N. O. \\ B. \end{smallmatrix}$ contain seed raised on black cotton ground, and which might be more advantageously sown on soils of a different description. The contents of those marked $\begin{smallmatrix} N. O. \\ R. \end{smallmatrix}$ was raised on our red soils, and may be sown for change on any soils within your reach, as I apprehend you have nothing similar to them, at least in the Lower Provinces of Bengal; our red soils being derived from disintegrated granite in which quartz is the preponderating mineral, combined with much red oxide of iron. Those marked B simply contain seed of our Bourbon Cotton, all grown on red soils.

Since writing my former note, I have been engaged in making up a report of our proceedings for the past season; but not having received all the returns, I am as yet unable to give you a general summary. The following items may however possibly be of service to those intending to use the seed sent.

On the black cotton ground, the New Orleans has generally produced light crops, as low as 161 lbs. of seed cotton per acre; while the native cotton, on the same, has yielded as much as 320 lbs. But as a set-off, the New Orleans gives from 29 to 30 per cent. of clean cotton; while the native gives only from 20 to 21 per cent. On the red soils, one field has yielded 248 lbs. per acre, while another is as low as 137½; the difference depending on the quality of the soils, as both were under the same management. The produce of only one

* See page, 281. No. VI.

field of the alluvial land has yet been received, and is the best; but falls far short of what I think we may expect from the same field in future seasons. The crop from that field averages nearly 410 lbs. per acre, over an area of 17 acres, on a considerable portion of which, the plant was nearly drowned out from its lying so low, that it could not be sufficiently drained. These results so far as they go, tend to prove, that the black or *regur* soil is the least adapted for American cotton: that the better sorts of red soil are superior, and that alluvial, such as paddy fields, which in course of long culture, have from annual deposits progressively attained too high a level to admit of sufficient irrigation, are the best. We are further led to believe, that the native plant cultivated according to the American method, yields probably as much as 20 per cent. more than when grown by the natives, even as a first trial, previous to any measures having been adopted for the improvement of the soil by manuring or otherwise. You must not attach too much importance to these rough statements which, as above mentioned, are founded on partial data; but may in the mean time prove of some use. By and bye I hope to be able to give you a more correct general summary of our proceedings for the whole season, which though not quite satisfactory, yet leaves no room to despair of ultimate success.

Memo. of Seed sent.

6 Bags of New Orleans, grown on red soil, ....	....	{ N. O. } R.	Hb 900
6 Ditto of New Orleans, grown on black soil, ....	....	{ N. O. } B.	„ 900
2 Ditto of Bourbon, ....	....	B.	„ 300
			Hb 2,100

(Signed) ROBERT WIGHT.

Coimbatore, 15th July, 1843.

[This seed was received, in very good condition, on the 2d September. On the morning of the 4th, ten seeds of the New Orleans Cotton, from the bag marked N. O. _B were put in the ground, the same number of seeds of the Bourbon Cotton were also sown at the same time, in less than four days, that is to say, on the evening of the 7th, every seed had vegetated. Members or others in Bengal, who may be desirous of engaging in Cotton cultivation, are recommended to lose no time in availing themselves of the opportunity of obtaining a portion of this fine supply, as the season for sowing the seed is nigh at hand.—
Sept. 11, 1843.]

REMARKS ON THE USEFUL PROPERTIES OF THE KULLYHAIN, RUFFICKEE AND OTHER TREES AT DARJILLING.

Communicated in the following Letter from Capt. G. BIDDULPH, dated Darjeeling, 14th July, 1843.

At length I have the pleasure to send by dāk banghy, the bark and fibre of the Kullyhain, and also the Ruffickee tree; from the former the *Lepchas* make rope, the latter stout bowstrings and sewing thread: nothing can be more simple than their mode of manufacture; the bark is torn off the Kullyham, when from 5 to 15 years' growth, the inner bark or fibre is then detached, as shewn in the specimen, washed for a few minutes in water, and when dry, pared or pulled into narrow strips, and twisted by the hand into rope of any thickness.

The bark of the Ruffickee is taken off the plant when five or six feet high, and treated in the same manner as the former, except that the outer bark only requires to be scraped off with a knife. All the *Lepcha* fishing nets are made from the Ruffickee, and are remarkably light and strong. The soft light-brown substance which I send, is the inner covering or bark of a beautiful species of edible Palm, found in rocky and secluded parts of the mountains 5 or 6,000 feet above the plain; it is used as tinder, after being dried and sprinkled over with burnt plantain leaf. This tree grows to a height of 30 or 40 feet, and the edible part is a pure white firm pith, as thick as a man's arm, and about 6 feet in length from the crown downwards, tasting something like a common nut. The *Lepchas* call the tree "Simmong Koong."

I have enclosed four pieces of the Ginger of these hills, common size, and five roots of the gigantic Yam, the latter should be planted a foot and half deep, in strong soil, and requires a long pole or dead tree to trail its branches up, the longer the branches the larger will be the roots; I have seen one considerably larger than a man's head. There is a large fern here called "Thookpoo" by the *Lepchas*, the root of which is dried, ground to flour, and made into bread; they also distil liquor from it. Strange to say, the *Lepchas* prefer these wild roots and their rice to our potatoes, which they are too idle to cultivate.

PROGRESS OF THE BRANCH AGRI-HORTICULTURAL SOCIETY OF
BHGAUGULPORE.

*Communicated in the following letter from Major T. E. A. NAPLETON,
Secretary of the Society, dated July 29, 1843.*

I have now the pleasure to acknowledge the receipt of your letter of the 19th of June last, in which you make known, that the Parent Society contributes to each of its Branch Institutions two Silver Medals and fifty Rupees every year, and in reply I am requested to inform you, that this mark of its countenance and support has been received with great satisfaction and due appreciation by the Bhaugulpore Branch Society. , May I be permitted to ask whether the boon under notice will be granted for the current year, and I need scarcely add, that it would be truly acceptable, as our Donation Fund in particular is now nearly exhausted, constant calls having lately been made on it for items such as the following :—

The purchase of 14 Bigahs of Lackeraaj ground, ..	Rs. 600
Sinking Wells,	150
Building Gateway, &c.,	80
Building Store Rooms and Mali's House,	130
Pucka Drains,	50
Chevaux de frise made of bamboo for enclosing the garden, ..	100
Workmen for clearing and ploughing the grounds, &c. &c., ..	200

, All this has been accomplished in ten weeks, and the garden is now nearly laid out.

The Cotton, Tobacco, Hemp, and other seeds so kindly forwarded by the Parent Society, arrived in excellent order.

Dr. Griffith has obligingly promised us some Darjeeling Barley, and it is now on its way to this place. I have, in a former communication, adverted to the sad want of a change of seed in this district, particularly in respect to Wheat and Barley ; and with the kind assistance of the Parent Society, we hope in a year or two, to distribute a good supply of fresh seed to the cultivators of the soil in this and the neighbouring districts. •

I have great pleasure in adding, that our list of Monthly Subscribers has swollen to 97, with a fair prospect of many more joining the Institution.

In conclusion, I am solicited to convey the best thanks and grateful acknowledgments of this Institution to the President and Members of the Parent Society, for the kind congratulations conveyed in your letter under reply, and further, for the very handsome aid it is at all times ready to afford us.

Notes on the Botany of His Majesty's Discovery Ships Erebus and Terror, in the Antarctic voyage, with some account of the Tussack Grass of the Falkland Islands.

Continued from page, 301.

The most interesting and useful vegetable production of the Falklands is undoubtedly the *Tussack Grass*; a name evidently given to it, from the immense tufts or *tussacks* formed by the plant, nor, indeed, is the appellation wholly restricted to this valuable esculent grass, but it is also applied to a species of *Carex* (*C. trifida* of Cavailles), which grows in a similar manner; a circumstance which gave rise to an important error: for specimens of the *Tussack Sedge* were put into the hands of the Botanist that a description might be forwarded to the Colonial Office, and accordingly a description of the *Sedge*, which indeed, in its young state, is eaten by the cattle, was transmitted instead of the grass. The error was quickly detected, and at the Governor's request, a full account, with a drawing and corresponding specimens, were received at the Colonial Office, and these have been obligingly placed in my hands, that they may be added to this brief notice of the botanical results of the expedition. A correct acquaintance with this *Grass* is the more important, because, as is well known, the great value of the Falklands to Britain arises from the vast numbers of cattle, (sprung from the original stock left many years ago by the Spaniards,) which feed and fatten there, and with which, vessels touching at those islands can be readily supplied. Also, because the nature of the soil and climate producing this grass gives every reason to believe, that the shores of a vast extent of England, Scotland and Ireland, would suit it equally well; more especially the Western coasts of the two latter countries. Indeed, public curiosity has already been strongly excited at home upon this topic by the mere newspaper reports, to a degree which is

perhaps only known to the writer of this article, who, from the deep interest he naturally feels in all that concerns the Natural History results of this expedition, and from his connexion with the Royal Botanic Gardens at Kew, has been overwhelmed with applications for seeds and plants of *Tussack Grass*, from the proprietors of unprofitable sandy and peaty soils throughout the British Dominions. To all, his answer has been, that, as yet, no living plants or seeds have reached Europe, which is, unfortunately, the fact. Already, too, from the best sources, a very excellent account, with a plate representing the tufts of this grass, has appeared in the *Gardener's Chronicle* for March 4, 1843,* a work so deservedly encouraged, that through its medium, the *Tussack Grass* is, by name and general aspect, rendered familiar to almost every one.

Pernettý, who, as above stated, accompanied Bougainville in the French ship *La Boudouse*, in 1766, would seem not to have fallen in with the finer tufts of this grass; if indeed it be not the *Carex trifida* of which he says, "We were half a league distant from two flat islands, which, at first view, appeared as if covered with small copse-wood; but as we afterwards discovered on landing, it was but tall Bullrushes or Cornflags; they grow, each of them, about 2½ feet high, and afterwards shoot out a tuft of green leaves, to nearly as much height more."

Bougainville's own notice of the plant is far more correct: "All the sea-coast and islands are covered with a plant, which has been erroneously termed a Cornflag, it is, however, a species of grass, of the most beautiful green colour, and growing to a height of 6 feet. It forms a hiding place for the sea-lions and sea-wolves, and served as a shelter to ourselves during our wanderings. A house may be formed of it in a very short space of time; the inclined stems, when fastened together, serving as a roof, while the dried straw makes a tolerably good bed. With this plant we also thatched our dwellings. The root is sweet and nutritious, and preferred by beasts to any other food."

The Botanist, M. Gaudichaud, who accompanied Freycinet in his Voyage round the World, after enumerating the remarkable plants of the Falkland Islands, thus speaks of the *Tussack Grass*: "Finally, there is one production of still higher interest, because it furnishes abundance of nourishing food all the year round, and this is the great Grass, *Festuca flabellata*, which covers two-thirds of the Isle of Penguins, and the other islets in the French Bay, and moreover, ac-

* For this plate see page, 253 of No. V.

according to the statement of M. Orne, may be seen in equal profusion on the shores of all the Falklands. The plant grows from 4 to 6 feet high, its leaves are sheathing and compressed. The inner portion of the stem, to the height of 5 or 6 inches above the root, is white and soft, crisp, agreeably flavoured, somewhat resembling Filberts, and very wholesome. This substance consists of the inmost sheathing bases of the central leaves and stalks closely compressed, and encased within each other. The taste is perhaps most like that of the highly esteemed *Mountain Cabbage Palm*."

Mr. Wright brought home a similar account of the *Tussack Grass*, and assured us that its young shoots are boiled and eaten like asparagus. He also showed us specimens and a drawing of the tufts of this Grass, as they appear in the small islets. From this drawing the woodcut was made for the *Gardener's Chronicle*, and the editor of that work has had the kindness to place the block in our hands, to be used on the present occasion. By far, however, the most interesting account of the *Tussack Grass* is that given in the Report above-mentioned, which was sent by the Governor, Lieut. R. C. Moody, R. E., to the Colonial Office.

"During several long rides," he says, "into the country, I have always found the *Tussack* flourishing most vigorously in spots exposed to the sea,* and on soil unfit for any other plant; viz. the rankest peat-bog, black or red. It is singular to observe the beaten footpaths of the wild cattle and horses, marked like a foot-track across fields in England; extending for miles over barren moorland,† and always terminating in some point or peninsula, covered with this favourite fodder; amid which one is almost certain to meet with solitary old bulls, or perhaps a herd of cattle; very likely a troop of wild horses, just trotting off as they scent the coming stranger from afar. To cultivate the *Tussack Grass*, I should recommend that its seed be sown in patches, just below the surface of the earth, and at distances of about 2 feet apart; it must afterwards be weeded out, for it grows very luxuriantly, frequently attaining a height of 6 or 7 feet. It should not be grazed, but cut and reaped in bundles. If cut, it quickly shoots up again, but is much injured by grazing; for all animals, especially pigs, tear it up to get at the sweet nutty-flavoured roots. I have not tried how it would be relish-

* "The wild west coast of Ireland would exactly suit this grass."

† "The poor soil, above described, covers about one-fourth of the surface of the country, and is the worst of all, as to herbage."

ed if made into hay, but cattle will eat the dry thatch off the roof of a house in winter; their preference to *Tussack Grass* being so great that they scent it a considerable distance, and use every effort to get at it. Some bundles, which had been stacked in the yard at the back of Government House, were quickly detected, and the cattle from the village made, every night, repeated attempts to reach them, which occasioned great trouble to the gentry upon duty."

The same Report contains also Dr. Hooker's description of the *Tussack*, which I here transcribe, and to which I have likewise added a figure and analysis, also sent home by the same Botanist. Dr. Hooker speaks of it under the name of *Festuca flabellata*, and it is certainly the plant so called by Lamarck, (who described it from Commerson's specimens, gathered by the latter Voyager in the Straits of Magelhaens,) and of the French Naturalists, but he correctly refers it to the genus *Dactylis*, and suggests, that it may probably be the *Dactylis cæspitosa* of Forster. A comparison with the original plants, though very indifferent specimens, deposited by Forster in the Banksian Herbarium, prove that Dr Hooker is quite right in this idea. Forster found the plant growing on New Year's Island, near Staten Land, and says of it that the *Magelhaenic Shag*, (*Pelicanus Magelhaenicus*.) commonly builds its nest upon the top of the great tufted bases of this plant, which are often two feet high.

DACTYLIS CÆSPITOSA. (Tab. IX. X)

Panicula spiciformi densa interrupta valde compressa, locustis brevissime pedicellatis late ovatis 4-floris, glumis subaequalibus, palea inferiore puberula apice bifida breviter aristata, culmis validis compressis foliisque longissimis distichis glaberrimis.

Dactylis cæspitosa. Forster in *Comment. Goett.* 9. p. 22. Willd. *Sp. Pl.* v. 1. p. 407.

Festuca cæspitosa. Ram. and Schult. *Syst. Veget.* v. 2. p. 732. Kunth, *Agrostogr.* p. 408.

Festuca flabellata. Lam. *Encycl. Bot.* t. 2. p. 462. Gaud. in *Ann. des Sc. Nat.* v. 5. p. 100., and in Freyc. *Voy. Bot.* p. 409. D'Urv. in *Mém. Soc. Linn.* v. 5. p. 603., and in Duperrey *Voy. Bot.* p. 36.

HAB. New Year's Island, Staten Land, Forster. Straits of Magelhaens, Commerson. Hermite Island, Cape Horn, J. D. Hooker. Falkland Islands, in the neighbourhood of the sea, on peaty, rocky and sandy soil, very abundant:—not seen inland,

This remarkable *Grass* is perennial, and grows with its densely matted roots, crowded but isolated hillocks, or tufts 3-6 feet in height, and 3 or 4 feet in diameter, from which the leaves and stems spring. *Roots* fibrous, the fibres very tortuose. *Stems*, or *culms*, numerous, rising from the hillocks, erect branched or divided only at the base, 3-4 feet long, smooth, compressed, leafy, pale yellow, abounding in saccharine matter, and when young, esculent, even for man. *Leaves*, the lower ones very long, not unfrequently 5 to 7 feet, exceeding the length of the stem, 1 inch broad at the base, and gradually tapering to an acuminate point, the upper side is channelled from the involute margins, from above the middle they are curved downwards, or are even pendent the stem-leaves are gradually shorter upwards, erect, the sides involute, their colour a pale glaucous green. The *sheaths* are, like the stem, compressed, smooth, striated, cleft at the top: the *ligule* very thin and membranaceous, rounded, or a little longer than broad. *Panicle* a span or more long, dense, so much so as to form a slightly interrupted, (not continuous) *spike*, $1\frac{1}{2}$ -2 inches broad, compressed, obtuse, —the branches short, erect, the rachis angled. *Spikelet* (or *Locust*) composed of 3-4 florets, of a pale yellow-green colour. The *calypine glumes* are lanceolate, acuminate, longer than the spike of flowers, slightly keeled, shortly ciliated on the back, $3\frac{1}{2}$ lines long, the margins a little involute and as well as the apex, membranous and transparent, the superior one little longer than the other, 3-nerved, the nerves ciliated. The *lower glume* or *palea* of the corolla is ovate, concave, compressed, sharply keeled, bluntly trifid at the apex, with the middle one of the three teeth the longest and somewhat incurved and awl-shaped, 5-nerved: the lateral nerves above evanescent, the margins scariose, the keel and nerves ciliated, the upper one much shorter than the lower, and with a double keel, 2-nerved, emarginate at the apex, except the nerves, which are ciliated and green. *Hypogynous scales* 2, broadly obovate, obliquely 2-lobed, the lobes ovate, acute, their margins laciniated, they are membranous, transparent, and only a little shorter than the ovary. *Stamens* 3. *Anthers* pale yellow. *Ovary* nearly ovate, glabrous. *Styles* elongated, approximate at the base. *Stigmas* plumose, lax. *Caryopsis*, or *fruit*, elongato-ovate, or almost cylindrical, slightly trigonous, of a pale yellow colour, and smooth.

References to the plate, and analysis of *Dactylis cespitosa* TAB. IX, X. Fig. 1. spikelet of flowers, *f.* 2. single flowers, *f.* 3. Stamens, pistil and hypogynous scales, *f.* 4. one of the hypogynous scales, *f.* 5. pollen-granules. —more or less magnified.

The opinion of the writer of the foregoing description is, that with proper attention to its propagation and locality near the coast, and preservation from being entirely eaten down where it already abounds, the *Tussack Grass* would, alone, yield abundant pasturage to as many cattle as there is ever likely to be a demand for on the Falklands.

The same writer proceeds to inform us that the immense abundance and luxuriant growth of this Grass, render it quite a striking feature in the landscape. The roots form great balls, which even rise 5 or 6 feet above the ground, and the long leaves, springing from the culms, hang down all round in the most graceful manner. The heaps or "tussacks" grow generally apart, but within a few feet of each other, the intermediate space of ground being quite bare of vegetation, so that in walking among them, you are perfectly hidden from view, and the whole *Tussack ground* forms a complete labyrinth.

The experiment of cultivating this valuable Grass promised to answer well in the Falklands, where, in the Governor's garden, it was coming up strongly from seed, drilled in rows, like Turnips. It must, however, be taken into consideration, that for *Tussack* to thrive in this country, the plant must so far change its habits of the Southern Hemisphere as to forget that our winter is its summer, and vice-versâ

D'Urville says, that the Penguins build their nests and hatch their young beneath the shady tufts of this grass.

The same despatch to the Colonial Office, in which the above description is given, contains also a letter from the botanist of the Antarctic Expedition to the governor, in which another grass, among the many valuable *Gramineæ* which the Falklands produce, is particularly noticed. This is of scarcely inferior importance to the *Tussack*, and being much more universally diffused over the islands, it must be far less particular as to soil and situation. It is a kind of *Fescue-Grass*, the *Festuca Alopecurus* of D'Urville (*Arundo Alopecurus*, Gaudichaud). In the Report presented to Governor Moody by the botanist, and transmitted to Lord Stanley, it is stated: "Another grass, however, of far more extensive distribution than the *Tussack*, scarcely yields to it in nutritious qualities. It covers every peat-bog with a dense and rich clothing of green in summer, and a pale yellow good hay during the winter season. This hay, though formed by nature without the operation of mowing and drying, keeps those cattle which have not access to the *Tussack* in excellent condi-

tion, as was proved by the beef with which our hunting parties supplied, for four months, the Discovery Ships. No bog, however rank, seems too bad for this plant to luxuriate upon, and as was observed during a surveying excursion which had been made to Port William, although the soil on the quartz districts was very unprolific in many good grasses which flourish on the clay-slate, and was generally speaking, of the worst description, still this *Fescue Grass* did not appear to be affected by the difference, nor did the cattle fail to eat down large tracts of such pasturage.

"The numerous troops of horses too, on the flanks of the Wickham heights, can procure little other fodder, while those of Mount Lowe and Mount Vernon must depend upon it entirely. Should the *Tussack* disappear from any part of the Falklands where stall-fed cattle are kept, it might be advisable to treat this *Fescue Grass*, as hay in England, by which process its nutritious qualities would, doubtless, be much better secured to the animals during winter, than by suffering the leaves gradually to wither, and not gathering them till nature has evaporated all the juices. For sheep it might also answer well, when converted into hay though it seems likely that the wet nature of this grass, together with the damp situations where it grows, would prevent these creatures from thriving upon it, if restricted to such diet, and at all event newly imported flocks should not be suddenly removed from dry food to what is of so very succulent a nature."

The Governor states in another despatch to the Colonial Office, that two Americans who wandered upon West Falkland for fourteen months, lived upon the roots (probably the young shoots from among the roots) daily, and formed their huts of the cushion-like base, rolling one to the small doorway or opening when night came on.

The species of Phænogamic plants that came under the notice of the Botanist during the winter-months spent at the Falklands, are thus enumerated in his letter; the names being, of course, subject to future revision. The numbers correspond with those in the collection.

1. *Hierochloe* (*Melica Magellanica*, Des Rouss.) 2. *Agrostis*, 3. *Ara*,
4. *Gunnera Magellanica* (*G. Falklandica*, Hooker Ic. Plant. t. 489, 490). The embryo has a superior radicle in a pendant seed.
5. *Portulacaceous* plant, *Colobanthus*, Bartling and Endlicher, closely allied to *Spergula apetala* of Labillardière from Van Diemen's Land.
6. A magnificent *Carex*, the "false Tussack" of the Falklands, pre-

bably *C. trifida* of Cavanilles. 7. *trisetum*? 8. *Gaimarad australis* the natural order very doubtful. 9. *Triticum*. 10. *Arundo Alopecurus* 11. *Agrostis*. 12. Ditto. 13. Ditto. 14. *Poa*. 15. *Festuca*. 16. Ditto. 17. Ditto. 18. *Agrostis*. 19. *Festuca*. 20. *Agrostis*. 21. *Empetrum rubrum*, "Diddie-Dec" of the colonists. 22. *Callixene marginata*. 23. *Arbutus* (perhaps rather a *Gaultheria*) *microphylla*? 24. *Nanodea muscosa*. 25. *Myrtus Nummularia*, used as tea. 26. *Crucifera*. 27. *Cardamine glacialis*, D. C. 28. *Arabis Macloviana*, of the Ic. Plant. t. 498 (*Brassica*, Gaudich.) 29. *Pernetia empetrifolia*. 30. *Atriplex*. 31. *Ranunculus*. 32. *Statis caespitosa*, Poir. 33. A plant unknown to me, but found also in Kerguelen's Island. 34. A singular umbelliferous plant, having the fructification of *Hydrocotyle*, but with fistulose leaves.* 35. *Caltha sagitata*. 36. *Ranunculus hydrophilus*. 37. *R. biternatus*. 38. *Stellaria debilis*, Gaud. 39. Specimens of *Myriophyllum*, shewing that *M. elatinoide*s and *M. ternatum* are one and the same. 40. *Bulliarda moschata*, Gaud. 41. A *Scleranthaceous* plant (*Mniarum biflorum*). 42. *Chilotrichum amelloides*, Cass (Ic. Plant. t. 485). 43. *Homoianthus echinatus* (Ic. Plant. t. 421.) 44. *Abrotanella emarginata*. 45. *Nassauvia Gaudichaudii*. 46. *N. Serpens*. 47. *Senecio vulgaris*. 48. *S. candicans*. 49. *Chabrea graveolens*. 50. *Aster Vahlü* (Ic. Plant. t. 486). 51. *Macrorhynchus*? *pumilus*, DC. 52. *Taraxacum*. 53. *Chevreulia lycopodioides*. 54. *Composita* 55. *Buccharis 3-dentata*. 56. *Gnaphalium affine*. 57. *Senecio littoralis*, var. *lunatus*. 58. *Azorella lycopodioides*, Gaud. 59. *A. filamentosa* (not of Lamarck, nor of Ic. Plant. t. 591.) 60. *Bolax glebaria* (Ic. Plant. t. 492.) 61. *Caldasia*, probably *Azorella daucoide*s of D'Urv, but a true *Caldasia*. 62. *Celeri* (*Apium graveolens*.) 63. An hydrocotyloid plant, perhaps *Azorella Ranunculus*, D'Urv. 64. *Rubus geoides* (Ic. Plant. t. 495). 65. *Veronica serpyllifolia*? but the stem furnished with minute hooked pubescence. 66. *Caltha appendiculata*. 67. *Gentiana Magellanica*. 68. *Calceolaria Fothergillii*. 69. *Oxalis enneaphylla*, (Ic. Pl. t. 449); this is an esculent, its foliage, as that of *O. crenata* from Chili, makes excellent tarts and jellics. 72. *Littorella*? 73. *Rumex*, perhaps *Acetosella*. 74. A highly curious and I think new genus of *Crucifera*, with long funiculi to the seeds. 75. *Gunnera* (vid. No. 4). 76. *Viola maculata* (Ic. Pl. t. 499) 77. *Acana adscendes*. 78. *Nerteria depressa*? but very different from

* Probably a species of *Cnautzia*, Nuttall, of North America, and identical with *C. attenuata* from Buenos Ayres (Hooker and Arn. in contributions to a Flora of South America.—See Hooker, Bot. Misc. vol. 3, p. 346). I possess a third and very distinct species, from the Andes of Quito, sent by Dr. W. Jameson.

the Bay of Island's plant 79. *Galium tridum* 80. *Primula*, not distinguishable from *P. farinosa*. 81. *Pratia repens* 82. *Lysimachia*, probably *L. repens*, D'Urv (Ic. Pl. t. 56), but this, again, is possibly too nearly allied to *Anagallis*. 83. *Acantholucida*, var. *pilosa*. 84. *Sagina*, near *S. procumbens*. 85. *Arenaria media*. 86. *Cerastium viscosum*. 87. *C. lineare* of Gaudichaud, if not of Persoon, but too close to *C. arvense*. 88. *Stellaria media*. 89. *Poa annua*. 90. *Carex*. 91. Ditto. 92. Ditto. 93. *Oreobolus obtusangulus*. 94. *Juncus grandiflorus*; the solitary-flowered species should form a separate group, (this is *Marsippospermum* of Desvaux, and Hook. Ic. Pl. t. 533). 95. *J. M'gellanicus*. 96. *J. Scheuchzerioides*. 97. *Luzula Alopecurus*. 98. *Sisyrinchium filifolium*. 99. *Chloræa* 100. *Eleocharis*. 101. Ditto. 102. *Astelia pumila*. 103. *Poa*. 104. *Tussack*, (*Dactylis cespitosa*, Forst.) 105. *Gnaphalium con sanguineum*

As the ships remained a few days at the Falkland Islands, after their return from Cape Horn, it is to be presumed that further additions were made to the collection, since the early summer was approaching, indeed, the botanist says, on one occasion, "I this morning took off my hat to the first flowering specimens of *Viola maculata* and *Calceolaria Fothergillii*."

We have now only briefly to notice the botanical results contained in the latest and very recent intelligence that has been received from the "Erebus and Terror," namely, a voyage made from the Falkland Islands to St. Martin's Cove, Hermite Island, which lies westward of Cape Horn, which noted promontory they consequently had to double, now for the second time, in order to attain it. By the naturalist, indeed, this visit could not fail to be hailed with peculiar pleasure; for, although situated in a higher, or more southern latitude than the Falkland Islands (nearly 56° of south latitude), or, indeed, than any spot, yet explored by the expedition, possessing aught of vegetable life; yet it was well ascertained to be a forest land, and that this forest was composed of two species of little known, yet highly beautiful *Beech-trees*, the one having deciduous and the other evergreen foliage. A third and still more interesting evergreen tree (for a tree it may be called, seeing that it attains a height of 40 to 50 feet), is the once celebrated *Winter's Bark*, (*Drimys Winteri* of Forster). By its first discoverers, its virtues were highly vaunted; but soon the bark of *Canella alba*, being much more easily procured, was substituted for it, and our antarctic *Drimys* is now unknown in the practice of physic.

To accomplish this voyage, the ships, with a portion of the officers, left Berkeley Sound on the 6th of September, the spring of these southern latitudes, and arrived at their place of destination on the 21st of the same month. Hermite Island may be considered the most southerly spot on the globe where any thing like arboresecent vegetation is to be found : and this circumstance is perhaps attributable to the proximity of the island, through the medium of Tierra del Fuego, to the southern extremity of the continent of America, which abounds in forests, the seeds from which may have been carried by birds, or wafted by winds and waters. The particulars of the peculiar productions of this country have not yet been transmitted, for the latest accounts were written soon after the return of the "Erebus and Terror" to the Falklands, on the 13th of November, and the time destined to examining and determining the specimens was during the ensuing third voyage to the ice, but the following hasty list of the phænogamous plants gathered during their brief stay, has been communicated.

"1. *Misodendron punctulatum*, Banks, but the character of the fructification is at variance with that of Poppig in Eudlicher's Genera. 2. A most curious little *saxifrageous-looking plant* and with the habit of *S. bryoides*; the leaves are singularly bicuspidate, the fruit is superior, 2-celled and has two styles yet it does not look like the capsule of a Saxifrage. 3. *Statice*, on the hills, where the snow has just left the ground. 4. *Scleranthea* * probably a *Mniarum*. 5. *Pernetia*, which ascends to the tops of the hills, 1750 feet. 7. Something quite new to me, not found in flower, but it has since shewn blossoms in the Ward's case,---not yet examined. 8. *Azorella*. 9. *Composita* *. 10. *Abrotanella*. 11. *Azorella lycopodioides*. 12. *Festuca*. 13. *Empetrum rubrum*. 14. *Carex*, very small. 15. *Caltha*, or an allied genus, near *C. appendiculata*; the leaves 2-lobed, lobes incurved and conduplicate, and fringed at the margin, reminding me of the leaves of *Dionæa*;† there are, besides, the same little ear-like

* In my Herbarium are specimens of this plant from Foister's Collection, given me under the name of "*Oxalis Magellanica*," Foist. Imperfect as is the description of *O. Magellanica* it is quite impossible it can apply to this plant, which belongs to the same group of *Caltha* as *C. appendiculata* and *sagittata*, so far as the appendages to the leaves are concerned, but these leaves are, otherwise, highly curious. The plant appears to grow in dense tufts, 2-3 inches high, thickly clothed with leaves and sheathed by the exceedingly large membranaceous stipules, two or three times the size of the leaf itself; they are petiolated, and at first sight might be taken for the closed leaves of *Dionæa* † being orbicular, fleshy, deeply cut into two parallel lobes, which are fringed at the margins, and folded the one upon the other, exactly as in the well-known *Fly-Trap* of America. On these lobes being

appendages at the base 16 *Mesodendron*, in flower, different from No. 1, having three stamens instead of two 17 *Caltha appendiculata* 18. Our poor friend Menzies's '*Viola 3-dentata*.' 19. Several forms of *Arbutus* (*Pernetia*) *mucronata*, for it is a very variable plant. 20. *Azorella* 21. *Oreobolus obtusangulus*. 22 *Veronica decussata* 23 *Gunnera*, the same as the Falkland Island species (*G. Falklandica*, Ic. Plant. t. 489-490) 24. *Myrtus Nummularia*. 25. *Juncus* 26. *Sisyrinchium* " very small and curious, with singularly compressed fruit,† 27 *Colobanthus* " 28 *Plantago* 29 *Deciduous Beech* (*Fagus Antarctica* of the London Journal of Botany, v. 1, t. 6), fl. ♂ 30. *Acacia*. A. variety of *Caltha sagittata* 32. *Cerastium* 33 *Primula*, probably identical with that which is found in the Falkland Islands 34 *Juncus acutiflorus*. 35. *Graminea* 36 *Drimys Winteri*, the wood of this tree has a glandular tissue, as in the Pines, and the genus *Tasmaniana* 37. *Berberis ilicifolia*. 31 *Berberis* (with foliage quite entire, as in *B. microphylla*, Forst., but verrucose flowers, like those of *B. ruscifolia*. 39 *Escalonia serrata* (Ic. Plant. t. 540). 40. *Haemargya* 41 *Balluarda* 42 *Ericacea*, but undetermined habit like *Pernetia* but fruit a dry capsule, and the calyx wholly interior and not in the least

forced back, however, they are found to enclose the two curious appendages of the base (like those of *Caltha appendiculata*. See Lessert's Icones, v. 1, t. 43 and *C. sagittata*. See Cavanilles' Icones, t. 44) notwithstanding that these lobes are themselves almost as large as the leaves, so that, when opened, the leaves are in reality 4-lobed, the lesser ones closely applied or folded upon the face of the larger ones, and these two folded again laterally upon themselves. The smaller lobes, or appendages, as well as the larger ones, are equally beautifully ciliated, and the inner faces of all are, besides, concave and minutely papillose. I shall propose for this plant the name of

Caltha (*Psychophila*, DC.) *dioneaefolia*, minuta, densissime caespitosa, ramosa, foliis petiolatis orbiculatis carnosius bilobis lobis conduplicatis appendiculisque appressis pulcherrime setoso-ciliatis intusque minutissime papillois, stipulis membranaceis maximis, pedunculo unifloro vix foliis longiore, sepalis 5 ovato-oblongis, staminibus 5-9, ovario sub-3

HAB. Tierra del Fuego, *Forster*. Hermit Island, at the southern extremity of Tierra del Fuego, *J. D. Hooker*.

* It was only on returning to the Falklands from Cape Horn, and just previously to writing the above, that Dr. Hooker had received intelligence of the death of his venerable friend Mr. Menzies, for whom he, in common with all those who knew his worth, entertained a great affection. Many notices of the stations of rare plants in distant regions did Mr. Menzies give to our young botanist before his embarkation, and the news of the decease of such a friend could not fail to touch him deeply, while traversing seas which had been visited by that amiable man fifty years before, when on his voyage round the globe with Capt. Vancouver.

† This was found by Mr. Wright in the Falkland Islands

fleshy. 44. *Donatia Magellanica*. 45. *Pernetia*. 46. *Composita*. 47. *Nanodea muscosa*. 48. and 49. *Compositæ*. 50. *Thalictrum* ? 51. *Fagus Forsteri* (London Journal of Botany, v. 2, t. 8) ♀. Probably among the specimens there may exist the *F. betuloides* of Mirbel (Mém. du Mus. d'Hist. Nat. v. 14, p. 469, t. 25, Pl. 6 in text, and *F. dubia*, Mirb. in the same work, and vol. Pl. 471, t. 26, in text, Pl. 7; which that author himself believes to be only a variety of *F. betuloides*, and there is good reason to believe this is identical with the *F. Forsteri*, or *Betula Antarctica*, Forst.). 52.—?. 53. *Ranunculus biternatus*. 54. *Pinguicula* ? one specimen only with fruit, and a withered corolla upon it. 55. *Leptinella* ? 56. *Galium*. 57. *Oxalis*. 58. *Drosera*. 59. *Cardamine*. 60. *Apium*. 61. *Chiliotrichum*. 62. *Azorella filamentosa*. 63. *Pratia* ? 64. *Acena* ? 65. *Gunnera*. 66. *Cineraria leucantha* ? 67. *Cineraria* ? 68. *Tussack* (*Dactylis caspitosa*) in full flower. 69. *Graminea*. 70. *Uncinia*. 71. to 76. Different Grasses, with only the withered remains of last season's flowers. 77. *Torresia*. 78. *Triticum*. 79. *Gaimarda Australis*. 80. *Astelia pumila*. 81. *Tetroncium Megellanicum* (Ic. Plant. t. 534). 82. *Oreobolus*. 83. *Callixene*. 84. *Juncus*.

The *Cryptogamiæ* are far more numerous, and I have paid particular attention to these, because other Naturalists can collect phænogamous plants, while few will be disposed to devote that minute attention necessary for the investigation of this Class. It has been an object with me to gather as many species as possible of each Natural Order, being extremely anxious to ascertain the proportion which the Natural Orders bear to each other in their respective Antarctic longitudes, and to each other in their own localities: as a matter of primary importance in the elucidation of Botanical Geography, and as evincing the effects of climate upon the Vegetable Kingdom, several of the tabular results I have already hastily drawn out show a delightful accordance; nor do I know of any result of this expedition which has given me so much pleasure as to find how beautifully certain groups rise in the scale as we proceed south, proving the accuracy of the learned Mr. Brown's views. As we advance in the Antarctic Regions, *Fungi* disappear and *Lichens* increase. Among the *Mosses* the *Pleurocarpi* diminish in proportion to the *Acrocarpi*; as does the relative number of *Pleurocarpi* which bear fruit, to those which are barren; *Cyperaceæ* decrease, and *Dicotyledones* bear a smaller proportion to the *Monocotyledones*."

Our latest tidings of the Antarctic Expedition were dated the Falkland Islands, Nov. 30th; about a fortnight after its return from

Hermite Island, and on the point of proceeding, as was expected, again to the south, in Weddell's track; there, we trust, to visit some of the New South Shetland group, where a Grass (*Aira Antarctica*) published by us in the "Icones Plantarum," was found, and which is perhaps the most southern phænogamic plant yet known to us. Previous, however, to the departure of the "Erebus" and "Terror," two very large Wardian cases were despatched to the Royal Botanic Gardens of Kew, filled with plants, the one the productions of Hermite Island, Cape Horn; the other containing the plants of the Falkland Islands, which latter was filled by the kindness of Mr. Lyall of the "Terror."

The boxes encountered a most stormy passage, but it is with infinite pleasure I can state, that several of the most interesting among the plants have arrived in good condition, and bid fair to prove great acquisitions to our Gardens, and I trust I may say to our Forest Scenery; for among those that have reached their destination in the best state, are healthy young trees of the beautiful Evergreen Beech (*Fagus Forsteri*), the Deciduous Beech (*Fagus Antarctica*), and the Winter's Bark (*Drimys Winteri*). So far as I know, the two first of these have never been introduced alive to this country, before, while the latter is so rare that, I believe, previous to the present importation, the only plant of *Winter's Bark* that existed in Europe, is the fine specimen, 12-14 feet high, in the Royal Botanic Gardens of Kew. Now, all these and several herbaceous plants in the Collections, such as the *Gunnera Falklandica*, *Caltha appendiculata*, *Berberis ilicifolia* with its fine hollylike leaves, as the name imports, and with flowers larger than those of any known species of the Genus, *Pernetia*, *Lomaria Magellanica*, *Asplenium Magellanicum*, &c. promise to do well. Many other plants had been placed in the cases, but did not survive the voyage: as young plants of the *Tussack*, a great number of the fine *Mosses* and *Jungermannia* of Tierra del Fuego, especially the noble *Polytrichum dendroideum*; these all perished. Already the duplicate living specimens are dispersed, far and wide, among the many friends of the Royal Botanic Gardens, and every exertion will be used by the recipients, and by ourselves, to increase the stock of these interesting strangers. It is to be lamented that the season of the year (winter) did not allow of perfect seeds of the *Tussack* being sent; but the Governor, in his letter to Lord Stanley, has promised to collect and forward ripe seeds, and has suggested that the Grass is worthy of trial, not only on the coast, but even in an inland situa-

tion, such as Chat-Moss; and the success, which has attended the germination of the seeds in Governor Moody's garden in the Falkland Islands, is certainly encouraging.

Although, as already noticed, our letters from the officers of the expedition bear date only to Nov. 30, 1842, we have received information by a more recent arrival from the Falklands, that the *Erebus* and *Terror* did not proceed to the south till after the first week in December, when, summer having commenced, we may confidently hope that the Botanists reaped a good harvest of flowering plants. It is believed that it was Capt. Ross's intention to proceed in the direction of Capt. Weddell's route, in order to verify his statements: in which case there exist many interesting groups of Islands in the way, which we trust will be visited. What success may have attended the navigator's approach to the Pole in that direction it is vain for us to conjecture. Of one thing we feel sure, that the gallant commander will perform all that a British navigator can do, and that the same spirit animates every officer and seaman attached to the Expedition. Should no further discoveries be made than have already been effected by this Voyage, yet these, we have reason to know, when the results shall be published, cannot fail to add to the glory of this nation, high as it already stands, in all that concerns maritime discovery and scientific research.

Royal Botanic Gardens, Kew. May 25, 1843.

While correcting for the press the last sheet of the above notes, the joyful news has reached England of the safe arrival of the Antarctic Discovery Ships at the Cape of Good Hope, on the 4th of April, after a third cruise in the dreary South Polar Regions, where they were brought up on the 5th of March, 1843, by the heavy Pack-ice, in lat. $71^{\circ} 30'$, long. 15° W. This point was a few miles to the south of any previous navigator but Weddell (themselves excepted), and, several degrees nearer the South Pole than had been attained by the brave but unfortunate D'Urville, during his attempt to follow in the same (that is Weddell's) track.

A brief sketch of this last cruise will be the more interesting, because, on this occasion, probably owing to the frequent occurrence of islands, and the comparative proximity of the South American continent and the Falklands, vegetation, such as it is, and requiring almost the eye of a botanist to descry its existence, was detected in latitudes far more southerly than during either of the two previous voyages.

The Expedition quitted Berkeley Sound, East Falkland, on the morning of the 17th of December, 1842, and making all sail, ran to the southward, with fresh breezes, gales, and much misty, foggy weather, till the 24th, when the position of the ships was a little eastward of Clarence Island, though the thick atmosphere prevented the land being made. On that day the navigators fell in with the first berg and much rotten ice, and saw some birds, the white *Chionis* of the Falklands, which are always a sure sign that land is near. On Christmas-day, the same cheerless weather prevailed though it must be remembered that the 25th of December is the mid-summer of the Southern Hemisphere. Snow-squalls and furious winds from the S. W. assailed them; but the evening becoming clearer, many icebergs were discerned and the first *White Petrel* gave intimation that the Pack-ice was at hand, for these beautiful birds are never seen away from the immediate edge of the Pack, and the ships accordingly fell in with it the same night. First passing through some heavy streams of ice, they made the Pack, running east and west, very heavy and formed of large pieces of rotten ice. Many bergs were floating about, apparently quite out of their element (if such an expression is allowable), for they were much broken up, and partially melted, looking very different, indeed, from the huge, hard, tubular masses which the navigators had been accustomed, during their two previous cruises, to meet with. The fogs continued so dense, that, though the surf was heard dashing over the ice, and thus apprizing the voyagers of the proximity of danger, it was impossible to see anything. On the 28th, the icy hulls of Palmer's and Louis Philippe's Islands were announced by the increasing coldness and clearness of the air, and several large barrier bergs, and much loose ice, floated in all directions. Many birds, large Finner Whales, and shoals of a smaller species, speckled black and white, were observed, and what deeply interested the botanist, as occurring in such a high southern latitude, the ships passed two much battered patches of *Sea-weed*, apparently belonging to the genus *Macrocytis*, but which it was impracticable to pick up. The land came in sight that evening. It is described as consisting of low hills, nearly covered with snow, with several islands lying off it, and terminating to the northward in a bluff, which is both further to the southward and eastward than the Pointe Française of D'Urville. The aspect is by no means fine or imposing, the land being low and of a rounded outline, apparently but a few hundred feet high, partially bare of snow, and presenting huge glaciers here and there.

Icebergs were very numerous, often blocking up the view of the horizon, and the sea was full of loose ice, much of which was stained brown, with those infusorial and confervoid remains, found abundantly by former navigators.

Many seals and penguins frequented the ice in this place, and the "Terror," passing several islets on the coast, was enabled to pick up a piece of sea-weed, which the surgeon of that ship gave to the botanist on board the "Erebus," by whom it was ascertained to be a singular new *Sargassum*, analogous to, but distinct from, a species previously found on Lord Auckland's Island, and he thus describes it:—"Fronde pinnatifid, its segments $1\frac{1}{2}$ inch long entire round, vesicles axillary solitary, and the diameter of a small grape, receptacles crowded together, shortly pedicellate axillary. Colour chocolate brown. Length 3 feet, sparingly branched. Dissections of the receptacles are made from the recent plant, and will be sent home." This sea-weed is probably allied to the *Fucus decurrens*, of Turner's *Historia Fucorum*, and is mentioned by Webster in the Appendix to Forster's Voyage,* under the head of Deception Island, one of the South Shetland group.

Two days were spent in endeavouring to get down to the south-eastward, but snow-storms and heavy Pack-ice rendered this hope fruitless, so that on the 30th, the "Erebus" bent her best bower cable, and bore up for the land again, which was approached somewhat to the south of where they had neared it, four days previously. The mountains were here of greater elevation, with several peaks, which were calculated at about 3,000 feet high, and all apparently of volcanic origin, though not active at the present day. Enormous glaciers might be seen, running along some parts of the coast for many miles, terminating towards the sea in icy precipices. On the little islands near the land, the snow was often melted; and though low, many of them presented remarkable craters, with numerous and very large icebergs floating round them. Several gulls, terns, cormorants and other sea-fowl were noticed here.

The last day of 1842 was fine and clear, enabling the voyagers to steer to the southward, through openings in the ice, with a strong tide or current, and in the evening they descried a most singular crater-shaped, conical island, to the south-west, backed by what

* "The *Fuci*, or *Sea-weeds*, were few and unimportant; the most common was found floating. It was of a pale chocolate colour, stem and branches flat, &c. The mode of reproduction appeared to be from a cluster of buds, appended to the terminal branches."—Forster's Voyage, vol. II, Appendix, p. 301.

appeared to be other low islands, all quite bare of snow, and these again, surmounted by many mountains of considerable elevation and tabular form, covered with snow and ice. What seemed separate islands, however, proved a continued land, and as it was thus impossible to be penetrated, the ships lay-to, among very thick ice; and to their disappointment, were waited northward, along with the surrounding bergs, by a tide (?) which required all their efforts to resist, and to maintain their position.

New Year's Day was also fair; the ships were then in lat. $64^{\circ} 14'$, long. $55^{\circ} 54'$, and lying off the above-described land, which forms a deep bight, in which is situated the small conical island. The coast trends from South to E.N.E. and ends in a bluff point covered with little extinct craters, and bare of snow. Many stupendous icebergs, of a tabular form, and from 2 to 5 miles long, formed a kind of chain from the point of land, all aground, and doubtless retaining the Pack in its place, like so many firmly-fixed piles. On the 2nd of January, the Pack closed upon the ships, which were accordingly made fast to a large piece of ice, with the view of preventing pressure and keeping them from drifting too far. The Floes were large, and much more like hummocks in their character than is general, appearing as if they had been broken up and consolidated again, full of holes, and covered with soft treacherous snow. Many birds were hovering about the ice, and among them, a few King Penguins, weighing 60-70 pounds, with *Hawk-Gulls*, *White Petrel*, and four or five other species of *Petrel*. A heavy northerly gale came on the next day, accompanied with mist and snow, and the ships cast off from the floe and got into a little pool of water, in which they beat about among ice, their object being to gain the bight, and the small crater-shaped island, which they were enabled to do on the 6th, when the weather again became clear, and the sun, to their great delight, shone forth. The botanist landed on the little island, and found it a most singular spot. He gathered upon it what he calls the ghosts of 18 cryptogamic plants, but there appeared no trace of phænogamic vegetation; and except one or two of the *Lichens*, all the species were extremely scarce. Of *Mosses* he found four kinds, one coming into fruit; and eight *Lichens*; among them, a *Parmelia*, the rest being crustaceous, except a *tremelloid* one; a green species of *Protococcus*, and *Ulva crispa*, apparently identical with the European species found in Ross's Islet, as stated in the list of Captain Parry's plants: thus, unless the *Red-snow*, spoken of by Forster, should prove the

real so named, plant of the Arctic regions, this *Ulex crispus*, with *Desmarestia aculeata* also gathered, are the only vegetable productions common to both extremities of our globe, and it would be interesting to ascertain what are the intermediate countries which they inhabit. *Asperococcus bullatus* ?, or a very nearly allied species, identical with what is found at Cape Horn, with the remains of an *Iridaea*, (also a Falkland Island species, *I. micans* ?) and an *Oscillatoria* or *Calothrix*, complete the list. The Botanist says, that though his specimens, the best which circumstances enabled him to procure, are but such poor scraps, that it was almost difficult to identify them, yet he felt it a great consolation, after so long a cruise, to gather any plants in regions far more southerly than vegetation had been supposed to inhabit. "I have prepared," he writes, "drawings of all the plants, one is a very beautiful and scarce little *Lichen*, a *Parmelia* of a golden yellow colour, with black scutella, which I should like to name after my kind godfather.* The *White Petrel* breeds in the cliffs, and there was a large colony of *Cormorants* and *Penguins* near the sea. I collected specimens of these birds and their eggs; also of the rocks, and of every thing I could find, without taking my eyes off the plants. I ascended the hill as high as was possible, but could not reach the summit, for we were only allowed three hours upon the island, and I dared not waste time in making such attempts. As it was, we were not half sufficiently long there to accomplish what I could have wished, for the difficulty I experienced in detecting any vegetation at all, convinces me that much may have eluded my researches, and that perhaps double as many plants might have been gathered, if I could have staid to seek for them. The *Sargassum* above-noticed, does not appear to grow on the shores."

The afternoon of the day during which this island was visited found the officers and crew with the less agreeable employment of towing the ships off the land, by the help of all their boats, for the winds were so light and the tide ran so strong, that it was difficult for the vessels to *hold their own*. At night a fresh breeze springing up, enabled the navigators to steer for the point of land before mentioned, and to pass with difficulty through the very nar-

* Little aware that the decease of this estimable man, and elegant scholar, the Rev. Jas. Dalton, late Rector of Croft, in Yorkshire, like that of the venerable Menzies, had recently taken place. Mr. Dalton paid particular attention to the *Lichens*, as well as to the *Mosses*, though he was well acquainted with phænogamic botany, and with the *Carices* in particular.

row channel, which separates this promontory from the chain of icebergs. This land proved on near inspection, to be an exceedingly slender cape, bare of snow, with steep banks dipping down to the sea, and full of extraordinary cracks and fissures, with its top covered with little cones and craters apparently formed of a mass of light brown volcanic mud, which had cracked while in the process of induration and through which the vents had protruded. Or possibly, this land might be composed of a mass of scoriæ, ejected from the little craters, which has been worn into perpendicular escarpments towards the sea by the action of the tides, and the fissures are caused by the snow melting. The voyagers were much struck by the singular aspect which these isolated pieces of land, quite bare of snow, and of vegetation, yet so very near an ice-bound continent, present. The weather continued so thick for three days, that the two ships were only enabled to keep company by firing guns and beating gongs, &c.

On the 9th, as the gloomy atmosphere and the ice, closing round, rendered voluntary progress impossible, and the tide drifted the "Erebus" towards a large stranded berg, the boats were lowered and she was towed off, and after running between two icebergs, she was made fast to a large floe, her position having, even then, to be constantly shifted as the ice turned round. This state of things continued till the 11th, when they cast off from the floe and made for a space of clear water between the Pack and the land, which they reached and then observed a barrier of ice or glacier, presenting a wall which much resembled, though it was on a smaller scale, the barrier twice encountered by the Antarctic expedition in lat. 78°. It is described as meeting the steep shore quite abruptly, and running back in a slanting line to the loftier land and mountains, forming a sloping wall, perhaps 70 feet high. The bergs which are seen in its vicinity, cannot have formed a portion of it and been broken off, as they are considerably loftier than itself and aground much further from the shores. Far as the eye could reach, this glacier skirted the coast to the south-east, the tide running very strong at its base and coloured of a burnt sienna hue by the infusorial and confervoid substance. On the 13th, at 2 P.M., the tide hurried both ships among the lee-ice, (or ice lying to leeward), a most troublesome and unfortunate circumstance, for the ice is, of course, much heaviest and most closely packed to leeward, and when once a ship gets entangled with it, she cannot sail out. The only mode of extrication by which a vessel can regain

the open water to windward, whence she came, is to warp out, by fastening lines to the hammocks on the ice, and bringing them to the capstan, gradually, against both wind and ice, heaving her a-head between the pieces. Several warps require to be out, from different parts at a time, and are hauled on, or brought to the windlass, capstan or winch, according to circumstances. All hands, on board must strain at this work, which cannot be pursued if there is much wind. As it was, five minutes sufficed to carry the "Erebus" into the lee ice on the 13th of February, and three hours were required to get her out again. The "Terror," being a quarter of a mile farther in, was not clear till next morning, all her men, of course, on deck, and fourteen hours of severe labour were spent in extricating her from this dangerous situation. The same scene of labour and peril was repeated the next two days with increased detention.

But so continued and so fatiguing were the baffling difficulties with which, day after day, and often during many nights, the persevering commander of the expedition and his officers were tried, that we cannot continue to particularize them, and shall sum up their month of January of this year (equivalent to our July) by saying, that the time was spent, generally near the Pack edge, in fruitless endeavours to proceed towards the south, sometimes beating about in little pools of water, and sometimes made fast to floes, with the agreeable diversity of weather afforded by gales of wind, snow-squalls, fogs and misty rain. If they endeavoured to penetrate the pack, which barred their southerly progress, they were beset with the ice and lost much time in getting out, and if they bore away, then the current and the course of the floating bergs took them to the north, the direction which of all others they sought to avoid. On the 4th of February, a heavy swell from the north-east indicated the proximity of clear water, and by dint of tacking and boring, they cleared the loose ice, and hoped, by going rapidly to the east, to reach Weddell's track, which Captain Ross trusted to find either quite open, or but little intercepted by ice. The prevalence of westerly winds in these latitudes favoured this supposition. But as if to disappoint their main object, the expedition was now doomed to encounter such a succession of easterly gales, right in their teeth, as they had never met with in all their previous experience of Antarctic navigation. The build of the "Erebus and Terror," which one of their officers terms "our round-nosed ships," was peculiarly unfavorable to making way against head-winds, and when they had

obtained a latitude, but a few miles to the south of where D'Urville had been foiled, they found the same heavy Pack-ice blocking up Weddell's homeward passage. Already the increasing darkness of the night, forbidding any progress during those hours of obscurity, rendered it impracticable to enter the Pack-ice, even had it been slack enough for them to do so; and the Captain had, therefore, no choice but to follow the edge of the Pack, keeping, if possible, to the southward of the French track, and wherever an opening might present itself, he intended to attempt following it in the direction of the Pole.

Until the 22nd, the Pack was accordingly traced, but on the next day, the ships lost sight of it, and glad to be making any way to the south, they joyfully began running S.E. in clear water, with bergs only, and no Pack-ice in view. For, though the rapidly lengthening nights, and the absolute necessity of risking navigation in the dark, if any progress at all was to be made, were enough to daunt the courage of those who knew something of the dangers which beset these dreary seas, yet such was the reluctance of Captain Ross and his officers to give up before accomplishing all they wished, that, even at this late season of the year, they persevered in pushing onwards. On the 28th of February, they re-crossed the Antarctic Circle, after having experienced another month of most unfavourable weather; for, except one day, it had snowed more or less throughout the month of February, and the sky was constantly obscured with clouds. The temperature, during this high summer of the South Polar climes, varied between 27° and 35° . When the wind blew from the north, coming over the warmer ocean, it invariably brought a thick and foggy atmosphere, the warmer vapours being condensed by the colder sea in this latitude. To this weather the Antarctic Regions are always subject. No great extreme of cold is experienced during summer, and still less any heat, either in the air or the sun's rays, intercepted, as these latter constantly are, by the fogs. The weather is never genial, and the moon and stars rarely, if ever, appear at night, when darkness comes on: probably no climate can be more uncongenial to vegetable life, or to what may be termed the *enjoyment* of human existence either. To add to these discomforts, once a week on an average, gales of wind are sure to blow, and then, when the ships are in open water, the heavy seas are such as to forbid any thing being done with comfort, as the vessel rolls, her bulwarks under water, and all hatches battened down.

Thus time wore on, in fruitless labours, till the 3rd of March, when that rare event, a calm, took place, enabling Capt. Ross to sound, or rather to try for bottom, with 4000 fathoms (24,000 feet) of line. It consisted of 250 fathoms of 1-inch rope, and 3,750 fathom of $\frac{3}{4}$ inch, with a weight of pig iron of 1 cwt.

On the 5th, the weather became very thick with snow-squalls, and many Petrels and much berg ice were seen. In the afternoon of that day, the ships again met the Pack-ice, and bore up in lat. $71^{\circ} 30'$, among the ice, which was very heavy, stretching in every direction far as the eye could reach. The rapidly falling barometer also indicated a gale, which was the more to be anticipated as the wind had been tolerably moderate for three or four days; and since the proximity of such tremendous masses of ice was very dangerous in the event of a storm, the ships hoisted a press of sail and endeavoured to clear the Pack and icebergs, which the falling snow rendered it difficult for them to descry and avoid. On the 7th the gale and the snow-squalls continued, and the most intense anxiety prevailed, because of the masses of ice which floated all around. The "Erebus" too, was clogged in her movements by her consort, the "Terror" and the latter was very heavily pressed at all to keep up with the former went diving and tearing through the water. Yet to have parted company might have caused the destruction of one or both vessels and their noble crews. No alternative remained but to quit these fearful regions, and accordingly, on the 9th the ships were finally put about. At this time, night commenced at 8 p.m. and dawn at 4 a.m., and when there was a moon, the state of the atmosphere prevented its showing any light.

On the 11th of March, the Antarctic Circle was recrossed; and the navigators began a rapid northerly passage, amid many very large icebergs, which it required incessant caution to avoid. On the 16th, the moon was seen for the first time during many months.

The course was now directed towards the land, laid down in the charts as Bouvet's Island, or Cape Circumcision, discovered by a French captain, Bouvet, about the middle of the last century, and ineffectually sought for by Captain Cook himself, and by the ship which separated from him, and was commanded by Captain Furneaux. The masters of two of Enderby's ships, the "Swan and Otter," are said to have seen this land in 1808, and they describe it as high, completely covered with snow, and unapproachable for many miles, because of the Pack-ice.

On the 19th, in lat. S. $54^{\circ} 31'$, long. W. $2^{\circ} 25'$ a heavy southerly gale came on, accompanied with gloomy sky & showers. Passing among icebergs, they approached the position assigned to Bouvet's Island; but the thick weather, and treacherous surf running, prevented the possibility of descrying any thing. At midnight the "Erebus" passed immediately to windward of a large mass of ice, and struck against a smaller piece, supposed to be from a berg close by. It was afterwards discovered that the "Terror" had come suddenly on an iceberg at the same time as the "Erebus", but happily saw the danger soon enough to bear up, and then ran close to the surf which was beating over all within a half a cable's length of the cliff. The light of the "Terror" had been observed to shoot a-head of the other ship, and though the reason of this manœuvre was not visible, yet it was rightly guessed to proceed from the vicinity of extreme peril. To have remained longer in such a situation, with the view of seeking for land of but doubtful existence, would have been madness, and Captain Ross assured that he must have passed close to the position assigned for it gave order to bear away for the Cape of Good Hope. The tremendous gales before which the Discovery Ships now ran were only uncomfortable for the construction is such, that in open water where there are no icebergs, no seas can possibly, humanly speaking, harm them.

On the 24th, in latitude, $50^{\circ} 30'$ to 51 degrees of the *Laminaria*, were observed floating, but the state of the sea rendered it impossible to pick them up. The eyes of the voyagers were greeted on the night of the 27th with the sight of the stars, which had not appeared since the ships had left New Zealand, in November 1841. Such is the climate of the cheerless regions of the southern hemisphere! The Botanist writes, on the 24th of March, "I am just called on deck, for the captain has been sounding for temperatures at various depths, and has brought up a stock of the *Laminaria* which I believe to be the same as one of the two species from Cape Horn. Like the *Sagasso weed*, this *Laminaria* grows and increases at sea. The stem (the root is gone) is cylindrical, and about 6 inches long, lamina not bigger than one's hand, divided into twelve lacinæ, 6-14, and even 20 feet in length, plane, varying in breadth from 2 inches to a foot, very coriaceous, composed of a cortex of dense, and when dry, horny tissue, and a single row of horizontal cells of very large size. Colour olive-yellow, olive-brown, or green, the older portions thick, wrinkled, and dark, the younger parts brighter

yellow, and slender, more tender and flatter, none of the apices entire. The southern *Laminariæ*, which, being among the giants of the aquatic vegetable kingdom, ought to be well known, appear almost entirely misunderstood. This plant, for instance, which I believe to be the *Laminaria*, or *D'Urvillea utilis*, referred to the *Laminariæ* both by Greville and Endlicher, certainly does not agree with the characters laid down by the former author, (vide p. 24 of his *British Algæ*). A sketch, which I made of it at Cape Horn, shews the sporules to be contained in distinct receptacles, embedded in the cortical substance, and appearing, on a transverse section, like a string of beads immediately under the surface; they open by pores and emit a mass of mucus, with spores most distinctly furnished with a pellucid limbus. These receptacles are scattered by thousands in the surface or cortical layer, and when their contents are ripe, they stain the hands of a rich brownish-black. As the weed dries, the contraction of the tissue expels the spores and mucus; which, on hardening, form myriads of little black tubercles on the surface, and then alone is the fructification conspicuous. All this is precisely as in *Himanthalia*; except that the central substance of this plant consists of large transverse cells. Greville, quoting Bory in confirmation, calls a part of the stem of the latter *fronda*, and the thongs he considers as *receptacles*: but, as far as I can see, his receptacles are precisely analogous to the lacinia of the *frond* of this *D'Urvillea*, (or *Laminaria*, whichever it may be). Further, I suspect the frond of the *Himanthalia* to be an abortive bladder, analogous to the trumpet of the *Ecklonia buccinalis*; for Greville says, the fronds are, at first, cylindrical and pear-shaped; then they fall in, and become plano-concave. Not being familiar with the structure of the British, or true species of the genus *Laminaria*, I cannot tell whether the *D'Urvillea* in question should belong to *Fucoideæ*, or *Laminariæ*: but assuredly, so far as published characters avail, to the former.

“When we reach the Cape of Good Hope, it is my intention to seek carefully for seeds of *Ecklonia*; for I incline to believe that, together with *Himanthalia* and *D'Urvillea*, it will form a very pretty group of *Algæ*. If the thongs of *Himanthalia* are receptacles, so must the lamina of *D'Urvillea* be; but I can see no reason why either should be considered as such. The sporules and their cells are quite analogous to those of a *Fucus* or *Sargassum*, where they are contained in what are undoubtedly receptacles. Thus the transition

will be very simple, through *Ceystosma* and *Halidrys*, where the leaves are gradually transformed into pods. This weed was much infested with barnacles."

On the 30th of March, the ships were fast approaching the Cape of Good Hope, with a mild air and soft wind. The whole time occupied in the last cruise, was spent in such tempestuous latitudes, and among such icy seas, that nothing new in the way of Natural History could be discovered; and accordingly, our young naturalist, who declares that mental occupation afforded him the sole relief from the anxieties and ennui incident on the voyage, had devoted himself to examining and making finished drawings of many of the plants found at former times. The *Mosses*, which were collected in the far southern regions, particularly engrossed his attention; and taking the learned Mr. Brown's Appendix to Ross and Parry's First Voyages as a model, he made full descriptions of them all. He says, "The genus *Andraea* puzzled me exceedingly, and occupied many days, during which I examined several hundred specimens. I do hope my drawings are scrupulously accurate, for I invariably compared them with descriptions made on the spot at the time of gathering the specimens, and I consider the mosses to have generally received three different examinations. Where there is so much novelty, I may have occasionally erected varieties into species; but in such a novel field, I trust some allowance will be made for any errors. All the *Gymnostoma* of the South are *funarioid* in habit and alliance, as Brown first remarked of the *Gymnostomum fasciculare*, &c. I have placed them, accordingly, at the end of *Brya*. The general arrangement I have adopted is that of Arnott, as modified by my father, (Sir W. Hooker), in Lindley's work on the *Natural Orders*. There are hardly any novel genera, my main object being rather to place the plants in their true position and relation, than to give them new names, and then leave other botanists to squeeze them in wherever a place can be found among their congeners. There exist many beautiful analogies among the groups of *Mosses*, but it is difficult to characterize the genera properly. *Gymnostomum* must be split; for there is hardly a genus of *Acrocarpi*, to which each of the species does not bear more affinity than to its congeners, in the present arrangement.

"The other drawings I have made will be found mere attempts, especially the *Lichens*, which are the first I ever tried in this Tribe. The descriptions are full. There seems to me a sad deficiency of tangible generic characters in this family, except among the larger

kinds. The green *globules* which form a *stratum* at the base of the *Asci*, in all those species which I have examined, are not noticed, so far as I can find, by any Botanist. I have also drawn the *Sargassum* of Deception Island and the *D'Urvillea*. The Flora of the Falklands has claimed some of my attention, but I have bestowed most pains on an introductory paper on the *Geographical Distribution of Antarctic plants*, distributing their relations to those of the Arctic regions, and the analogies which exist between the Antarctic, Polynesian and American Floras.

“Circumstances have prevented my doing much during this cruise among the marine animals. I lost all my gauze among the Pack-ice, from the water being full of little pieces of ice; and where there has been open sea, the gales blowing and a heavy swell running prevented the possibility of using the tow-net. I hope to pursue my drawing diligently on the passage between the Cape of Good Hope and England, and to study all the plants of the Cape and Rio which I can pick up while we stay at those Ports. But I have forgotten almost all that I ever knew of Tropical Botany, or even garden flowers, not having seen so much as a Rose since quitting New Zealand, almost two years ago.

“I often think of the Ward's Case which I sent home from the Falklands last November; and I hope the *Beeches*, especially, may have reached England alive; they were in such fine order when despatched! But, without seeing the *deciduous Beech* of Fuegia no one can form any idea of the exquisite beauty of its budding leaves. I trust these trees will thrive at Kew. Next to a good *Arboretum* at the Royal Gardens, I should like there to be a Fern-House. The noble *Tree-ferns*, huge *Acrosticha* and *Stegania*, with the *Hymenophylla* creeping on the ground, would be a splendid novelty. And *Ferns* are very easy of transportation. The more I saw of the *Filices*, the more I was convinced that their geographical distribution chiefly depended on an uniform and moist temperature, such as is generally found in islands. All the Magelhaenic species that inhabit the Falklands, acquire there a harsh and coriaceous consistency, from the vicissitudes of a temperature and of the hygrometric state of the air to which they are exposed. The Kerguelen island *Stegania* I believe to be the most Antarctic of ferns, though its position as to latitude is far lower than that of many others.”

Happily and usefully, as above detailed, was the Botanist occupied in the interval between quitting the ice and arriving at the Cape of

Good Hope; where, as already stated, the ships came safely to anchor on the 4th of April, 1843.

Thus, by the undaunted skill of the most accomplished of Navigators and through a merciful Providence, such a series of investigations has been carried on, for three successive summers in the South Polar Regions, as cannot fail to prove of inestimable value to science in its various departments, and to maintain, for the British Navy, that pre-eminent rank which it has so long held among the nations; "terrible in war," and during times of peace, engaged in extending the boundaries of useful knowledge, promoting navigation and commerce, and prosecuting geographical discoveries through the remotest regions of our globe.

During this long and hazardous voyage of four years' duration, much of it pursued through unknown seas, and amid perils and privations of no ordinary character, disease has never entered the ships, nor have any casualties taken place beyond what must be expected in every protracted cruise, under the most favourable circumstances. One poor fellow washed overboard in the tremendous seas between Kerguelen's Island and Van Dieman's Island, and another, in the awful hurricane described as occurring on the night of the 12—13th March, already mentioned in this article, are, I believe the only deaths: and a single officer and sailor invalided and sent home from the Falklands, but both, now, happily recovered, comprise all the sufferers by accident or illness.

A month's stay at the Cape of Good Hope, was anticipated, which, it was hoped, might yield some good herborizing, and an agreeable meeting with Dr. Wallich, Director of the H. E. I. Company's Botanic Garden at Calcutta, and now at the Cape for the benefit of his health; unless, indeed, that gentleman should still be on his tour in the interior. His society would afford some compensation for the absence of Mr. Wilmot.*

From the Cape, St. Helena was to be the next place visited, and then Rio; so that, we trust, ere autumn has closed, these enterprising and successful antarctic Voyagers will be welcomed to their native shores.—*From the London Journal of Botany for July, 1843.*

* Frederick Eardly Wilmot, Esq. (son of the recently appointed Governor of Van Dieman's Island, Sir Eardly Wilmot, Bart.) one of the officers of the Antarctic Expedition, who had been left in charge of the corresponding Observatory at Cape Town, on the first arrival of the ships at that port in 1840, but is now on a visit to England. Mr. Wilmot is about to return to the Cape, and as we understand, to be engaged in an important survey of a distant part of that colony.

Persian Melons.

A communication which appeared in the *Chronicle* of the 29th ult., on the culture of the Persian Melon, induces me to offer a few remarks corroborative of the justness of the writer's ideas, from some years' observation of the culture of the Melon in India. My observations are confined to the western side of India, and chiefly to that part of the Deccan or Mahratta country, between the 16th and 21st parallels of latitude.

The time of sowing the seed commences in the latter part of January, just after the height of the cold season is past, and is continued up to the beginning of March. Ripe Melons begin to appear in the latter part of April, and are in the greatest abundance and perfection throughout May, and even continue well until June, if the rains do not set in early, and destroy or wash the Melon-beds away. The period I have indicated comprehends the driest, and part of the hottest time of the year. In February, the days are temperately warm, and the nights generally chill. In March, the hot season begins to be sensibly felt, the nights, however, remaining pleasantly cool. Throughout April and May, there is a progressive accession of temperature, the thermometer ranging from 90° to 100° and upwards by day, accompanied with a dry hot wind, and seldom falling below 80° at night.

The Melons are grown in the beds of rivers from which the water has receded, the stream at this period of the year being confined to a small part of the channel. The Melon-beds are perhaps not more than a foot above the surface or level of the stream, and hence there is an ample and constant supply of moisture at the roots; for, since the beds are composed of nothing but the shingle or loose gravel of the bed of the river, the water percolates freely beneath their whole extent.

The natives, as far as I have observed, take very little pains in the cultivation of the Melon, and grow all sorts promiscuously, apparently without any selection, and Melons and Cucumbers indiscriminately mixed together in the same beds. Hence, as might be expected from such a course of procedure, you meet with great numbers of very indifferent quality, more like half Melons and half Cucumbers than anything else; others of very fair quality, and others again, in the same bed with the worst, of very superior excellence, sufficient to shew what might be done with more attention, and that high temperature, dry air, and abundant moisture at the roots, are the conditions most favourable to ensure excellence.

The fault generally observable in frame produced Melons I think is, that the flesh is of too firm or hard a quality, and perhaps deficient in

sweetness and delicacy of flavour. The best Indian Melons I have met with are, on the other hand, of a rich melting quality, abounding in saccharine juice, of a very fragrant flavour. I found, however, that these qualities became much altered when grown at another period of the year; having once made some experiments on the cultivation of the Melon in common garden-mould in the monsoon, or rainy season, in a part of the country where the rains are generally light, and that year they were more so than usual. At no time was there a continuous fall of rain for ten hours, and there were intervals of three weeks and upwards without any rain, but the general state of the air was moist, and the direct influence of the sun was often intercepted by light clouds, or a hazy state of the upper atmosphere, which, however, did not prevent the transmission of considerable heat from the sun to the earth. The thermometer averaged from 76° to 80° in the day, and 70° at night. The seeds had been taken from a very delicious Melon, and the change was therefore the more observable. The plants grew well, but perfected their fruit with some difficulty, some decaying at half size. Those which ripened possessed much of the original fine flavour of the parent fruit, but the sweetness had nearly all disappeared, and the flesh had acquired the firm, hard quality which I have observed so much in our frame-grown Melons.

Besides the Melons grown in the hot season, there is also a variety grown in fields and gardens in the monsoon, or rainy season, which I take to be merely the former, somewhat altered in its qualities and habits by culture at a very different season. These monsoon Melons are very hardy and of rapid growth, and their general character is akin to what I have stated above as the result of experiment, in the fruit being deficient in sweetness, and the flesh being either hard or mealy, but they often possess considerable flavour, which is heightened or brought out by the addition of sugar — *Gardeners' Chronicle*, May 13, 1843.



BOKHARA CLOVER.

At a meeting of the Royal Agricultural Society on the 26th April, 1843, Mr. Rodwell communicated the following account of specimens of Bokhara Clover he had presented to the Society, and the results of his experience in the garden cultivation of this plant. Specimen No. 1. The growth of 1841. Seed sown, April 21. The plant the growth of 138 days. First year's produce. Length 8 feet 11 inches. Specimen No. 2. The growth of 1842. Second year's produce from the roots of the former year. Pressed when in blossom. Growth of 125 days. Length 11 feet 4 inches. Specimen No. 3. Growth of 1842. Second year's produce from the roots of the former year. Pressed when in seed. Growth of 189 weeks. Length 12 feet 10 inches.—They were treated thus, beginning with April 21, 1841:—Seed sown in drills about 18 inches apart, each seed having a space of 6 inches in the drills. The soil a rich loamy mould, deep and dry. The subsoil, loamy craig, about 4 feet from land-springs. Preparation, deep digging and manuring after a crop of potatoes. Cultivation in May, hoeing and weeding in the usual manner. In June, its rapid growth (at the rate of an inch in 24 hours), and its disposition to throw out lateral shoots, requiring great care and attention in giving it support during some of the genial days in this month. In July, the same attention as in the preceding month. In September, the specimen No. 1 was gathered and dried when in full bloom. In October, the produce was carefully cut down, and applied for fodder to cattle. Horses not fond of it, cows and pigs prefer other food. 1842.—Early in the spring of this year the plants which had been carefully cut down in the autumn, began to exhibit their spring shoots long before the Lucerne shoots were visible; thus establishing two important points—early vegetation and great hardiness. The plant now required great care and attention in supporting the lateral branches, so as to prevent them falling.

Early in June the blossoms began to make their appearance, and continued to make fresh bloom during the months of July and August, forming not only an ornamental but a very fragrant garden plant. In this state, the specimen No. 2 was taken as an average growth. In August and September the seed-pods were formed and began to ripen; and the seed gathered at the end of September, yielding eight pounds to the square rod. The specimen No. 3 was gathered at the same time. Upon the usefulness of this plant, I am at present unable to give any very favourable report, its properties for feeding cattle having no great recommendation, as it was found that a preference was

always given to any other food, either in its green or dried state. It has shewn itself with my mode of treatment a biennial plant, no vegetation having appeared during the present year, this, however, may possibly not be its characteristic with repeated cuttings in a green state, a point which I have not at present ascertained by trial. - Mr. H. Gibbs corroborated Mr. Rodwell's remarks, as to the unwillingness of animals to eat the plant when Lucerne could be had by them. Mr. Gibbs' idea was, to cut and stack the Clover in alternate layers with oat straw, and afterwards cut the two into chaff for use; also, to mix it with grass in haymaking, when there was the chance of damage from wet weather, so as to impart a good smell to the hay, and thereby give it the character of hay to the gup - *Gardeners' Chronicle*, May 6, 1843.

Monthly Proceedings of the Society.

(Wednesday, the 9th of August, 1843.)

William Griffith, Esq. Vice President, in the Chair.

T. F. Henley, Esq. who was proposed at the last meeting, was elected a member of the Society.

Candidates for Election.

The names of the following gentlemen were submitted as Candidates for election —

J. P. Cazenave, Esq. Indigo Planter Sook Saugor—Proposed by Mr. W. P. Downing, seconded by the Secretary.

Captain Arthur Hall, 5th Light Cavalry (Staff Department)—Proposed by the Secretary, seconded by Mr. William Storm.

Tahb Ally Khan, of Gya—Proposed by Mr. William Quentin, seconded by the Secretary.

Lieutenant John C. Brooke (63rd N. I.) Adjutant Meywar Bheel Corps—Proposed by the Secretary, seconded by Mr. D. W. Fraser.

John Knott, Esq. Deputy Collector, Backergunge—Proposed by Mr. R. R. Sturt, seconded by the Secretary.

Henry Mornay, Esq. of Calcutta—Proposed by Mr. L. Wray, seconded by the Secretary.

Henry Lemarchand, Esq. of Ghazepore—Proposed by Mr. Wray, seconded by the Secretary.

Presentations to the Library.

1. Twelfth and Thirteenth Reports of the Society of Natural History at Mauritius.—*Presented by the Society.*

2. The Indian Review, No IV of vol. I.—*Presented by the Proprietor.*

3. Transactions of the Agri-Horticultural Society of Western India. No. II. Quarterly issue.—*Presented by the Society.*

4. The Indian Journal of Medical and Physical Science, No. VII. of vol. I.—*Presented by the Proprietor.*

5. The Calcutta Literary Gleaner, No. VI. of vol. II —*Presented by the Proprietor.*

6. London's Suburban Horticulturist, and O'Shaughnessy's Bengal Dispensary.—*Purchased by the Society.*

Museum and Garden

1. A small assortment of Italian Flower and Garden Seeds.—*Presented by Mr. James Thomason*

2. A box of bulbous Plants.—*Presented by Mr. Edward O Riley.*

Mr. O'Riley states, that these plants are very common in the Jungles of the Tenasserim Coast. They produce a most beautiful flower. The Burmese name for the plant is "Pedango."

3. Samples of the bark and fibre of the "Kallyham" and "Ruffickce" Trees, of the bark of a beautiful species of Edible Palm, seed of the ground Raspberry, a few roots of Ginger of the common size and of the gigantic Yam of Darjeeling.—*Presented by Captain G. Biddulph.*—(For Capt. B.'s letter, see page, 321.)

4. A large Pomegranate, measuring 15 inches in circumference, and weighing 77 sicca weight, the produce of Mr Earle's Garden at Serampore.—*Forwarded for exhibition.*

Hemp and Flax Culture at Chittagong.

The first paper submitted, was a Report of the Flax and Hemp Committee on the samples of Hemp and Flax, which were forwarded from Chittagong by Mr. Sconce, and presented at the May Meeting.—(See page 273.)

At the conclusion of the reading of the Report, and on an intimation from the Secretary, that the Finance Committee were of opinion the state of the funds would admit of the appropriation of the sum required, viz. 200 Rs., it was proposed by Dr. Mouat, seconded by Mr. Storm, and resolved, that the Report of the Flax Committee be confirmed.

Nursery Garden.

A short report of the Garden Committee, at a meeting held on the 12th ultimo, was next read. The Committee state, that all the cane is in fine order, but that the Cotton and Carolina Paddy promise little or nothing. The ground being generally very foul, and it having been the

practice to plough in the weed, &c. as green manure, it was ordered that ground prepared in future should be trenched so deep as to expose the roots of all the weeds, and that these should on no account be ploughed in. The Committee close their report with a few suggestions for the better carrying on of operations at the garden. The report was confirmed.

Carey Testimonial.

The Secretary stated, that in pursuance of the resolution passed at the June Meeting, That a clay bust of the late Dr. Carey be made from the engraving in the possession of the Society, he had communicated with Dr. Mouat (who had kindly offered to superintend the execution of the work,) and had the pleasure to draw the attention of the members to the bust on the table, and to read the following letter from that gentleman on the subject:—

JAMES HOUAT, ESQ.

Hon'g. Secy. Agr. Horticultural Society

SIR,

I have the honor to forward to the Society the bust of the late Dr. Carey, which has been executed at the Medical College by *Noboo Coomarr Paul*, the native sculptor, a self-taught person, who has displayed a degree of talent and ingenuity which I think fairly entitle him to some mark of distinction and encouragement. As the clay Bust is to be sent to England, for the purpose of guiding the sculptor who may be selected by the Society to execute the Bust in marble, I venture to suggest, that it should be submitted to the Society of Arts in London, as a specimen of the degree of skill exhibited by an untaught native of India, in one of the highest and most difficult branches of Art. The Society, I am sure, would not hesitate to bestow some mark of their approbation upon the man, both as a stimulus to himself, and an encouragement to others. It must be remembered that he has worked under every disadvantage, in having only an engraving to guide him, and that doubts were entertained, when the measure was first proposed, of his being able to succeed at all.

With respect to the fidelity of the likeness, I beg to enclose a note from Dr. Carey's son, who kindly attended at my office on two or three occasions, to guide the man in making such alterations as he deemed necessary. The result has been most gratifying, and the testimony advanced in its favour unexceptionable.

I have &c.

(Signed) FRED. J. MOUAT, M. D.

Medical College, July 29, 1843.

Resolved.—That Dr. Mouat's suggestion be agreed to, and further, that in accordance with the resolution passed at the General Meeting of the Society on the 14th Sept. last, it be now left to the Finance Committee to make the necessary arrangements for the transmission of the bust to England, and for all other details connected with the testimonial.

Replies to Queries on Chinese Manures and Chinese Agriculture in general.

The Secretary desired to submit the following communication from Dr. Mouat, forwarding a series of valuable papers on the subject of Chinese Manures, which have been drawn up for the Society, by Mr. Assistant Surgeon A. Grant of the H. C. S. attached to H. M.'s 55th Regt. at Chusan, by the Rev. C. Gutzlaff, and by Mr. G. Fradescant Lay, Interpreter to H. M. Special Mission.

JAMES HUME, Esq.

Honorary Secretary Agri-Horticultural Society

SIR,—I beg to forward to you, for publication in the Society's Journal, should they be deemed worthy of a place in that periodical, the enclosed replies to Queries on Chinese manures, which were drawn up by Dr. Lyon Playfair, the distinguished chemist to the Royal Agricultural Society of England, and published in the 3rd number of the 1st vol. of our Society's Journal. I forwarded copies of the Queries in question to several friends in China, and to one of them, Dr. Shanks, Her Majesty's 55th Regiment, quartered on the Island of Chusan, I am indebted for the papers lately received. I have taken the liberty of furnishing Dr. Playfair with copies of the enclosed documents, as he is engaged in an extended series of investigations upon this important branch of Agricultural Chemistry, and is anxious to obtain information from every part of the world, to render his researches more complete and perfect. I would take advantage of the present favourable opportunity again to direct the attention of members in various parts of India to the subject, and to solicit replies from them. None have hitherto been received, and yet a large amount of valuable information might be easily furnished without much trouble to those who are favourably situated, and must necessarily, from the nature of their pursuits, be acquainted with the peculiarities and composition of the manures used by native cultivators in their several districts.

I have &c.,

(Signed)

F. J. MOUAT, M.D.

Medical College, July 29, 1843.

Resolved.—That the best thanks of the Society be offered to Drs. Mouat and Shanks, and that the Replies be transferred to the Committee of Papers for publication in the Journal.

Defaulters to the Society.

The Secretary intimated that, in accordance with the resolution of the last meeting, a final application for their arrears of subscriptions had been made to the five members, whose names were then submitted by the Finance Committee. Two of these gentlemen had liquidated the amount due by them, but the other three had paid no attention to the demand. He would now beg, on behalf of the Committee, to take the instructions of the meeting on the subject.

Proposed by Mr. Storm, seconded by Dr. Mouat, and unanimously resolved,—That the names of these three members be placed on the proceedings, and published as defaulters to the Society. The following are the defaulters in question:—

Defaulters under the Resolution passed at the meeting of 14th June 1813; viz. "That when a member of the Society intimates his desire to cease to be a member his name be forthwith erased, without continuing his subscription, subject nevertheless to his name being published among the defaulters if his arrears of subscription are not paid."

Mr. T. J. Bell, Indigo Planter, Kishnaghur, for two years' subscription due at the period of his resignation. Baboo Cour Kaleekissen Roy, of Calcutta, for subscription for five quarters.

Defaulter under the Resolution agreed on at the meeting of 16th September 1812; viz. "That the Finance Committee have the power to revise from time to time the list of subscriptions in arrear, and that they be empowered to publish periodically the names of those defaulters, the recovery of whose subscriptions is hopeless."

Baboo Keenut Sing, of Purneah, for subscription unpaid during five years.

Presentation of Tennessee and acclimated Cotton Seed.

A letter from Dr. Hufnagle, offering, for the acceptance of the Society, one tierce and five barrels of *Tennessee* Cotton seed, was next read. The following is an extract of the letter:—

"This seed was ordered by our Society more than two years ago, but delays and difficulties occurred, and the shipment was prevented until lately. The zeal displayed formerly for the improvement of Cotton by the importation of foreign seed appears to have subsided,

and I do not ask of the Society to make a purchase of this, but believing that of the staple and texture of Indian Cotton is to be improved at all, it must be by the introduction of seed from *inland* localities, I beg to present this lot of seed from the Middle States of America for the acceptance of the Society."

Resolved.—That the best thanks of the Society be given to Mr. Huffleagle, and the Secretary be directed to take advantage of his handsome contribution.

In connection with the subject, the Secretary submitted extract of a communication with which he had been favored by Dr. Robert Wight at Coimbatore.—(See page, 319.)

In reply to a query from a member, the Secretary stated that he had of late received frequent applications for Cotton seed from various parts of the country, but that, in consequence of the Government withdrawal of free transmission by *banghy*, in addition to that by letter dawk, he was unable to comply with these requests, save to those parties whose localities were within the range of communication by the river steamers, as but few of the applicants were willing to incur the heavy expense which large dispatches by *banghy* would necessarily entail, more particularly when the object in view was, in most instances, of a public and not a private nature

Bangalore Branch Society.

A communication was read from Major Napleton, Secretary of the Branch Agricultural Society at Bangalore, requesting that the yearly donation of 50 rupees and two silver medals which are annually granted by the Parent Society, may be accorded to their Branch Society for the *current year*, although the Society was not established till after that period of the year in which such annual donations are made.

Major Napleton states, that the expenses incurred for the purchase of ground for their garden, the sinking of wells, erection of show rooms, employment of workmen for clearing and ploughing the grounds, &c. &c., have exceeded twelve hundred rupees, and nearly exhausted their Donation Fund; and any extra assistance would therefore be truly acceptable. Major Napleton adds, that the above-mentioned work has been accomplished in ten weeks, and the garden is now nearly laid out; further, that their list of monthly subscribers has swollen to 97, with a fair prospect of many more joining the Institution.

On the proposition of Mr. W. Storm, seconded by Mr. L. Wray, it was unanimously resolved, that the request of the Bangalore Branch Society be complied with.

Communications on various subjects

The following letters were likewise submitted to the meeting :—

1. From Lieut. Col. J. R. Ouseley, in continuation of his letter read at the last meeting enclosing copy of correspondence in 1837, with the Bombay Government, regarding the superior quality of the Hoshungabad coal.

Colonel Ouseley offers some further remarks respecting the probable advantages that would result from the formation of rail-roads in India.

2. From Mr T. J. Finne, dated Agia, July 14, submitting a drawing of a new ‘Cultivator,’ which he has lately made, together with a descriptive account of the manner in which it is to be employed.

3. From a Member of the Society, submitting a proposition for introducing the *Telfaria pedata* into India.

The Secretary mentioned, that Mr. Heber had obligingly offered his services in procuring seeds of this plant from the Mauritius, where it is cultivated.

The above three communications were transferred to the Committee of Papers.

For all the foregoing communications and presentations, the thanks of the Society were accorded.

Observed at 9-150 m.

Barometer.	Temperature.		Wind.
	Of the Air.	Of the Surface.	
54.8	81.8	84.4	S.
54.9	82.0	85.0	S.
55.0	82.0	85.5	S.
55.1	82.0	86.0	S.
55.2	82.0	86.5	S.
55.3	82.0	87.0	S.
55.4	82.0	87.5	S.
55.5	82.0	88.0	S.
55.6	82.0	88.5	S.
55.7	82.0	89.0	S.
55.8	82.0	89.5	S.
55.9	82.0	90.0	S.
56.0	82.0	90.5	S.
56.1	82.0	91.0	S.
56.2	82.0	91.5	S.
56.3	82.0	92.0	S.
56.4	82.0	92.5	S.
56.5	82.0	93.0	S.
56.6	82.0	93.5	S.
56.7	82.0	94.0	S.
56.8	82.0	94.5	S.
56.9	82.0	95.0	S.
57.0	82.0	95.5	S.
57.1	82.0	96.0	S.
57.2	82.0	96.5	S.
57.3	82.0	97.0	S.
57.4	82.0	97.5	S.
57.5	82.0	98.0	S.
57.6	82.0	98.5	S.
57.7	82.0	99.0	S.
57.8	82.0	99.5	S.
57.9	82.0	100.0	S.
58.0	82.0	100.5	S.
58.1	82.0	101.0	S.
58.2	82.0	101.5	S.
58.3	82.0	102.0	S.
58.4	82.0	102.5	S.
58.5	82.0	103.0	S.
58.6	82.0	103.5	S.
58.7	82.0	104.0	S.
58.8	82.0	104.5	S.
58.9	82.0	105.0	S.
59.0	82.0	105.5	S.
59.1	82.0	106.0	S.
59.2	82.0	106.5	S.
59.3	82.0	107.0	S.
59.4	82.0	107.5	S.
59.5	82.0	108.0	S.
59.6	82.0	108.5	S.
59.7	82.0	109.0	S.
59.8	82.0	109.5	S.
59.9	82.0	110.0	S.
60.0	82.0	110.5	S.
60.1	82.0	111.0	S.
60.2	82.0	111.5	S.
60.3	82.0	112.0	S.
60.4	82.0	112.5	S.
60.5	82.0	113.0	S.
60.6	82.0	113.5	S.
60.7	82.0	114.0	S.
60.8	82.0	114.5	S.
60.9	82.0	115.0	S.
61.0	82.0	115.5	S.
61.1	82.0	116.0	S.
61.2	82.0	116.5	S.
61.3	82.0	117.0	S.
61.4	82.0	117.5	S.
61.5	82.0	118.0	S.
61.6	82.0	118.5	S.
61.7	82.0	119.0	S.
61.8	82.0	119.5	S.
61.9	82.0	120.0	S.
62.0	82.0	120.5	S.
62.1	82.0	121.0	S.
62.2	82.0	121.5	S.
62.3	82.0	122.0	S.
62.4	82.0	122.5	S.
62.5	82.0	123.0	S.
62.6	82.0	123.5	S.
62.7	82.0	124.0	S.
62.8	82.0	124.5	S.
62.9	82.0	125.0	S.
63.0	82.0	125.5	S.
63.1	82.0	126.0	S.
63.2	82.0	126.5	S.
63.3	82.0	127.0	S.
63.4	82.0	127.5	S.
63.5	82.0	128.0	S.
63.6	82.0	128.5	S.
63.7	82.0	129.0	S.
63.8	82.0	129.5	S.
63.9	82.0	130.0	S.

Observed at 4 P. M.

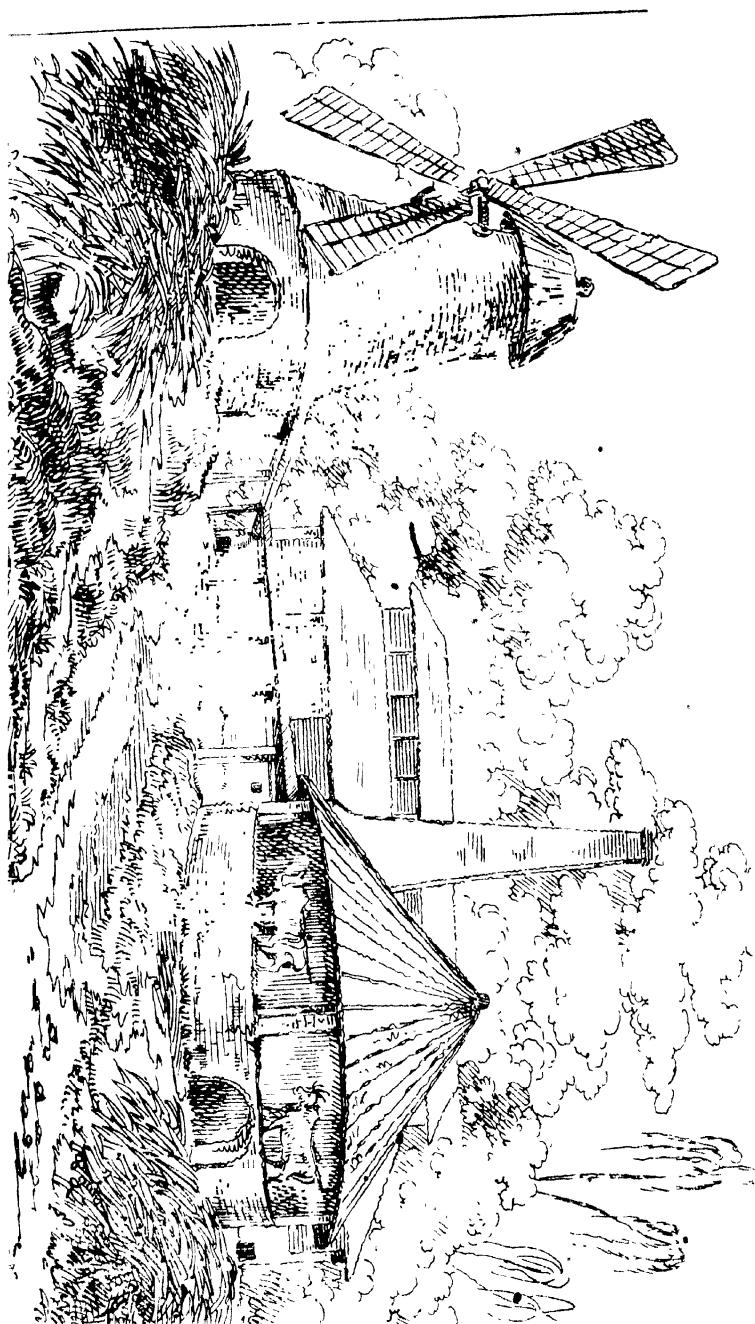
Barometer		Temperature.		Wind.		Aspect of the Sky.	Direction.		Upper.	Lower.
Inches.	On the Mer.	Of the Air.	On the Surface.	Direction.	Force.					
29.531	85.5	77.4	76.0	E	0	Overcast.		Inches	0.33	0.44
29.509	82.0	83.0	79.0	E	0	Cloudy.				
29.505	81.5	83.4	78.0	E	0	Cloudy.			0.42	0.62
29.506	82.9	84.4	81.0	E	0	Cloudy.			0.27	0.34
29.493	83.1	84.5	81.0	E	0	Nimble.			0.79	0.80
29.500	83.9	86.4	82.2	E	0	Cloudy.			0.16	0.22
29.514	82.0	86.4	82.0	E	0	Nimble.			0.63	0.72
29.500	83.5	83.0	82.0	E	0	Cloudy.			1.02	1.15
29.477	80.6	84.7	82.0	E	0	Cloudy.			0.15	0.8
29.482	83.9	84.7	82.0	E	0	Cloudy.			0.22	0.26
29.485	83.2	87.0	81.0	E	0	Cloudy.			0.82	0.51
29.507	83.5	86.6	81.0	E	0	Cloudy.			0.69	0.08
29.509	86.0	86.0	86.8	E	0	Cloudy.			1.07	1.15
29.490	84.2	83.0	82.0	E	0	Cloudy.			0.56	0.60
29.502	84.0	83.0	83.0	E	0	Cloudy.			0.07	0.09
29.538	84.6	85.4	84.0	E	0	Cloudy.			0.12	0.17
29.531	82.6	86.3	80.5	E	0	Cloudy.			0.40	0.45
29.442	85.5	92.6	89.5	E	0	Cloudy.			0.27	0.41
29.471	87.0	91.6	85.1	E	0	Cloudy.			0.19	0.07
29.492	83.9	87.5	84.0	E	0	Cloudy.			0.20	0.22
29.490	84.0	86.0	82.2	E	0	Cloudy.			0.54	0.63
29.493	84.0	87.6	82.5	E	0	Cloudy.			0.18	0.21
29.478	82.2	82.5	80.2	E	0	Cloudy.			0.24	0.30
29.470	81.6	80.5	78.5	E	0	Cloudy.			8.67	10.18
29.470	81.6	80.5	78.4	E	0	Cloudy.				
29.488	82.2	83.0	80.0	E	0	Cloudy.				
29.498	85.4	95.0	82.0	E	0	Cloudy.				
29.434	84.5	89.1	83.5	E	0	Cloudy.				
29.454	85.9	90.8	81.5	E	0	Cloudy.				
29.418	85.4	89.0	81.0	E	0	Cloudy.				
29.462	84.0	85.1	81.0	E	0	Cloudy.				
29.500	84.4	87.1	84.0	E	0	Cloudy.				
29.495	84.0	86.5	82.6	E	0	Cloudy.				

(continued)

(continued)

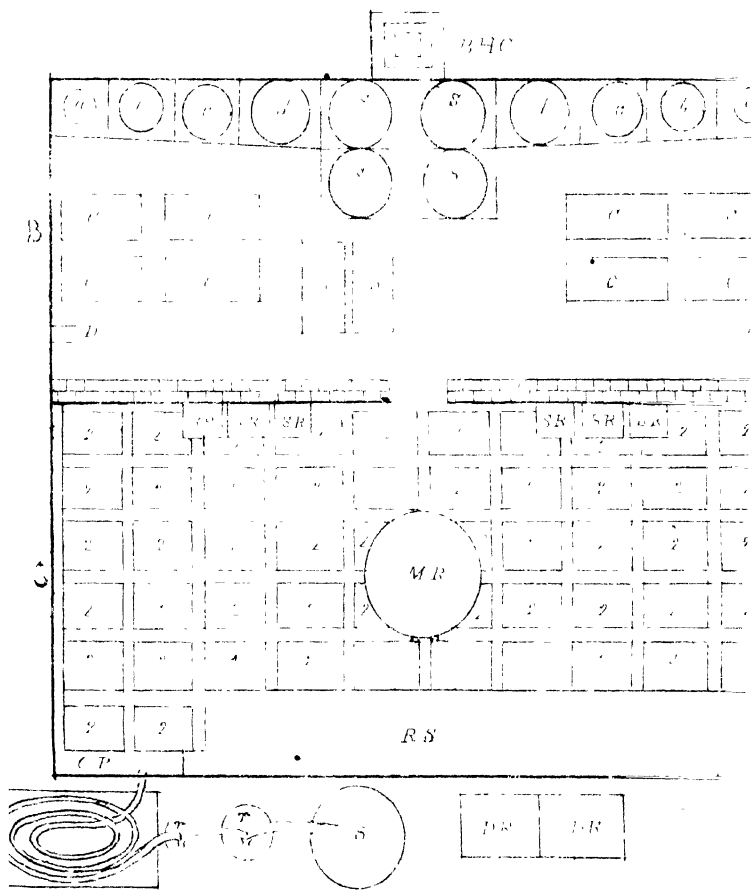
[illegible][illegible]

N. B. From a comparison of the two Barometers, the Mercury in that at the Dispensary stands 1-10th c
higher than that in use at the Surveyor General's Office.



D D Two door ways.
 a b c d. Two Sets of Boilers.
 S S S S Four Syphons or Clarifiers.
 R R. Two Cold receivers, on pillars of about 12 feet high.

C C C. Four Coolers in each set.
 B H Boiling House.
 B C Boiling House Chimney.

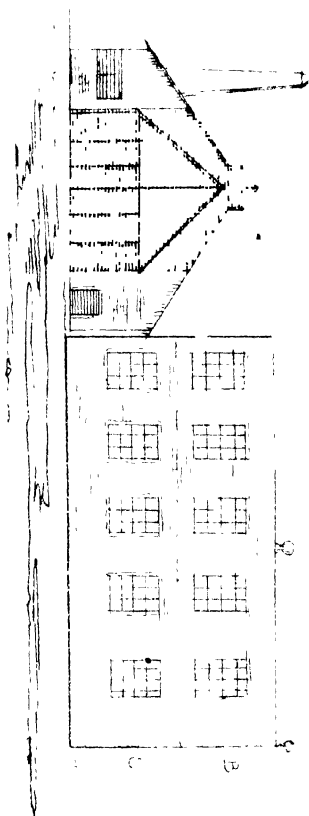


S.H. Still House.
 S.H, S.R, S.R, Two Sets of Skimming
 Receivers.
 M.R. Molasses Receiver (large Tin)
 2.2.2. Fermenting Cisterns sunk in
 the ground.

D.R. D.R. Two Dunder Receivers
 S B T T A Still and Double ret
 C.W.C. Cold Water Cistern, or T
 W. Worm of Still
 C. P Can Pit
 R.S. Rum Stores.

SIDE VIEW OF BOILING STILL AND CURING HOUSES.

- A The Boiling House 32 feet wide.
- B The Curing House } 43 feet do.
- C The Distill House }



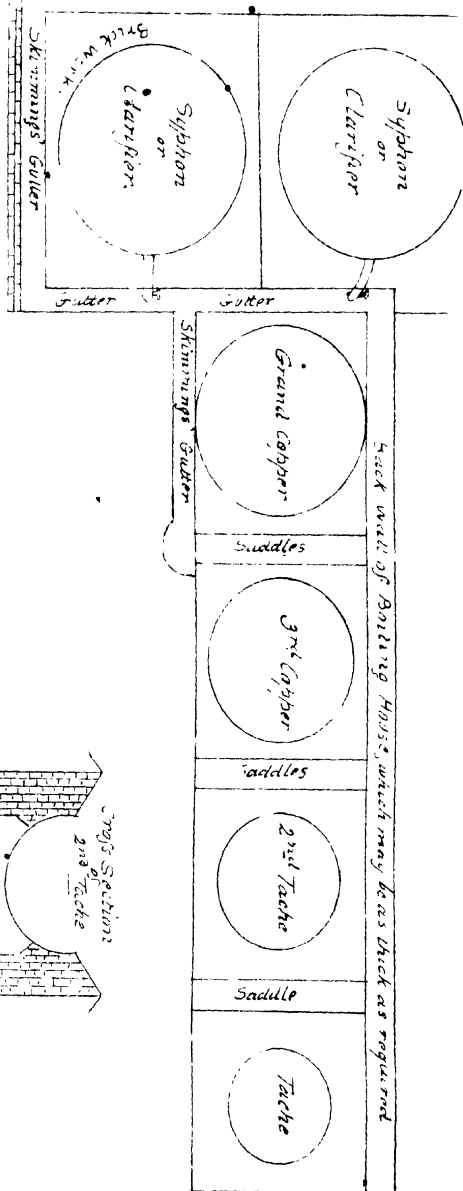
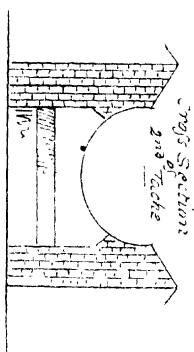


Figure 1. Schematic diagram of the processing plant.



1. The two ends of the road
 2. The two ends of the road
 3. The two ends of the road

4. The two ends of the road

5. The two ends of the road

6. The two ends of the road

7. The two ends of the road

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22. The two ends of the road

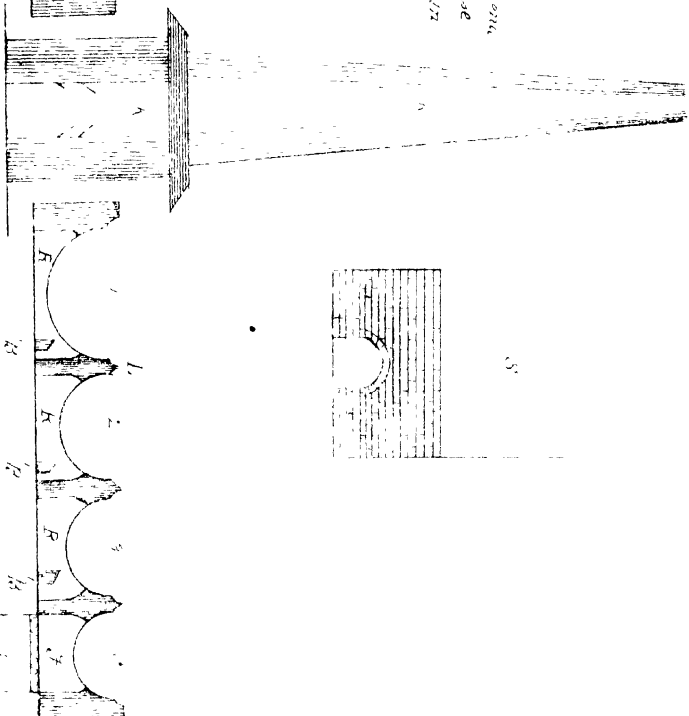
23. The two ends of the road

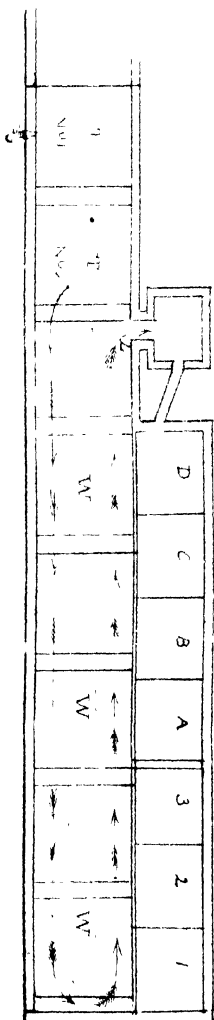
24. The two ends of the road

25. The two ends of the road

26. The two ends of the road

27. The two ends of the road





1. The boiler is a vertical cylinder, and is connected to the cylinder by a crosshead and connecting rod.
 2. The boiler is a vertical cylinder, and is connected to the cylinder by a crosshead and connecting rod.
 3. The boiler is a vertical cylinder, and is connected to the cylinder by a crosshead and connecting rod.
 4. The boiler is a vertical cylinder, and is connected to the cylinder by a crosshead and connecting rod.
 5. The boiler is a vertical cylinder, and is connected to the cylinder by a crosshead and connecting rod.
 6. The boiler is a vertical cylinder, and is connected to the cylinder by a crosshead and connecting rod.
- 1 & 2 Three Cold Receivers next to which are -
A B C Four Syphons or Churners, the flues of which connect with the chimney

Correspondence and Selections.

RESULT OF EXPERIMENTS AT LUCKNOW ON SEEDS OBTAINED FROM THE SOCIETY.

*Extract of letter from Captain G. E. HOLLINGS, dated 19th August,
1843.*

Although I have not written to you for some time, you must not suppose that my zeal in the cause in which we are so much interested has at all abated; the fact is, I have had very little to say, and therefore thought it better to defer writing until I could communicate the result of my experiments on some of the seeds which you so kindly forwarded to me. I did not receive them before, as it was supposed, the rains had fairly set in, but as the ground had been fully prepared with regard to ploughing and manuring, I lost no time in sowing the cotton seeds; I regret that I have to report that none of them have germinated, whilst those from plants which have been in the garden for some years have sprung up luxuriantly. I do not know how to account for this, except by the supposition that as the seeds sent by you were sown when the ground was saturated with water, they rotted before germination could take place. The hemp seed has also failed, but I saw before it was sown, that it had been seriously injured by keeping, and from the first I had little hopes of its springing up.

None of the bean seeds, except those of the Maurit'is black bean, "Pois Noir," (which are very luxuriant,) have germinated. You must not suppose from what I have written, that I confined the experiment of growing the seeds above referred to, to our own garden; a portion was given to gentlemen in cantonments, whose gardens are distant more than five miles from ours; nevertheless, with the exception of a few cotton seeds which have germinated in Captain Younge's garden, the result is the same, and therefore I conclude that the cotton and hemp seeds, and beans, were not in a germinating condition when they reached me. I regret much that I have not yet been able to forward you a supply of violet seeds, I have reason to

expect some from the hills ; I need not say, that, if I receive them, your commission shall be immediately executed.

The lucerne planted in the garden has not attained any degree of perfection, and therefore I thought it better not to send you any seed. It is grown extensively near Lucknow, and the seed is procurable in any quantity in the bazar, but the quality is not very superior ; should you still wish to get seed, I can send you any quantity you may require.

All the cucumber seeds you sent have vegetated, and promise to yield abundant crops.

The tobacco and Tinnevely senna have also germinated I will let you know the result when the produce is gathered in.

I had hoped to give you some account of a late peach, which ought to be in perfection at the present writing, but unfortunately, in spite of my precaution of putting on a netting to keep off birds, the fruit was attacked by wasps, and none ripened. The tree is a curious one, and the fruit is protected by the leaves, so that on looking at it, you cannot perceive a single peach ; but on raising the leaves you see the fruit in clusters.

I will, at a future period, let you know what success has attended the sowing of the other seeds you so kindly forwarded. I have both peas and potatoes *growing* at the present moment, but I have great doubts of their reaching maturity.

I have long been thinking of writing an account, as far as my own experience will admit, of the agricultural capabilities of Oude, which I might do with some advantage, as I have travelled over every district in it ; but from the conviction of my deficiency in scientific knowledge I am almost afraid to undertake it. Should I at any future period commit the result of my observations and crude remarks to paper, I shall calculate on the favorable consideration of those who may be called upon to read them.

I have found more difficulty in translating and preparing the accounts of what has been done in the garden than I anticipated ; you may rest assured, that they will be prepared with as little delay as possible. The plants from the acclimatised Otaheite sugar cane are far more luxuriant than they have been for some years, and by re-

peated washings of the roots with a solution of assafoetida, I have succeeded in getting rid of the white ants, the greatest enemies we had to contend against.

When the proper time arrives, I will attend to your request regarding vine cuttings.

I have succeeded in keeping all the fine plants which I got from Goruckpore alive, and have no doubt of cultivating the fruit with success. The asparagus plants from American seed are thriving, and as they have survived transplanting and the rains, I trust they will in due season produce good fruit.

Before concluding this letter, I must notice the opinion given by Dr. Mouat, regarding the specimen of arrow-root forwarded by me, the faults which he found were to be attributed to the packing and the effects of climate in transit. The arrow-root was not prepared or packed as an article of commerce, and my only object in asking for an opinion was to ascertain its *nutritious* qualities. I have no doubt of the correctness of Dr. Mouat's opinion, and that the specimen forwarded, on reaching Calcutta, had all the defects he mentions; but at the same time I can safely affirm, that at Lucknow it has neither been found musty or indissoluble in water; and, that if it is fair to judge by the appearance of the children who have been fed on it, it is very nutritious. I have deemed it right to say thus much, because I am alone to blame for the faults in the packing, whilst the lady who prepared it, deserves the best thanks of those who have used the arrow-root, for the care, skill, and attention with which she executed her labour of love.

I omitted to mention, that during the present season I have sold, for the benefit of the garden, fifty-seven grafts of mangoe trees, four years old, at eight rupees each; they are the only trees for which a good price can be obtained, and I hope that in a few years they will be found in every garden in Oude.

The Vines from seeds given by Sir William Nott, G. C. B., and brought from Cabool, are in excellent order.

RESULT OF TRIALS ON SEEDS OBTAINED FROM THE SOCIETY.

*Communicated by T. J. FINNIE, Esq., in the following letter, dated
Agra, 20th August, 1843.*

I have the pleasure to acknowledge the receipt of your note of the 20th ultimo, accompanied by a small box of the wheat and barley which were sent to the Society by Dr. Royle. The package was marked "Letter Dak," but came by Banghy, so it did not reach me until the 11th instant. I receive the seeds with many thanks, and when the proper season arrives, will plant them carefully, and will be more particular in reporting the result of my observations than I have hitherto been; had I been more successful, or had I been able to communicate any thing gratifying to the Society or myself, I should probably have been more punctual. It was not entirely owing to want of success that has prevented me from giving you a favorable report of some of the seeds you sent me last year, but to accidental circumstances which contributed greatly to deprive me of the pleasure of furnishing a satisfactory report. My remissness hitherto has, I fear, caused you to doubt my willingness to assist the Society in its laudable endeavours to introduce better seeds, as well as a better mode of cultivating them into this country; but allow me to assure you, that as long as I remain in the country, nothing will afford me so much pleasure as to be in any way instrumental in improving its agriculture; but I suppose it is necessary to atone for my past negligence by reporting the result of the experiments upon the seed already submitted to my care, that you may place more reliance upon my promises and future exertions.

I will commence with the small package of American vegetable seeds you so kindly sent me the other day. They arrived safe, and as my garden was not ready for their reception, I made them over to the Secretary of our Agricultural Society here, and they were planted in the Society's garden, and have come up beautifully, without a single exception, I believe, and are now growing as finely as this weather will permit, (we have had no rain since the 29th ultimo); of their progress and result I will inform you hereafter.

The box of seeds which you despatched on the 10th of February by steamer, has not yet arrived, but is on the way up the river. I regret exceedingly it did not get here sooner, as it contains many seeds for

the wet weather, which I wanted much, but the season is now too late for them; I will however attend particularly to the wheat and barley at the proper season. I had like to have forgotten to mention the safe arrival of a small packet of different kinds of wheat and barley forwarded to me during the month of January, there was also a very small paper of English flax and hemp seed, which I have lately sown with care, rather late, but they were stored away in moving, and overlooked until a few days ago. Early in the season I planted a paper of *Russian* flax seed, sent me in August 1842, too late for planting, but I am sorry to say they have not come up.

A small packet of Indian corn sent me by the late Secretary, was carefully planted about the 1st of July 1842, and tended with all the care possible, but the worms attacked the bud and devoured it in spite of all the attention I could bestow upon it, and not an ear matured. This was represented as one of the best varieties of the American maize, but I at once recognized it as the sweet-grained garden corn, and only used, and in fact only fit, for *roasting ears* early in the season. I however made some very fine corn from seed furnished me by Mr. R. Montgomery, Collector of Allahabad. This is far superior to the common corn of the country, but far inferior in quality to our fine Mississippi field corn, which I think would be worth the Society's while to get, also some pumpkin seed, and a splendid *pea* which would flourish beautifully in this country; all these articles I sent out from my own fields, of the best variety the country produced, and I know they arrived in England, but I have not heard of them since. If my local acquaintance and knowledge of the kind of seed available in the south, suited to this country, will be of any value to the Society, I shall be most happy to order some out. I would order many things out on my own account if I could afford it.

The large number of wheat and barley samples which I received from the late Dr. Spry, was planted in a well-prepared piece of land about the close of October 1842, and when I left home about the 1st of November, I gave particular instructions that it should be carefully attended to, but whether from inattention, or badness of the seed, I know not, they never came up, which I regret exceedingly.

Had I remained at home during last winter, I should have been able to give you a most favourable report of the *Bhilsa* and *Cuba*

tobacco seed sent me by the late Secretary. I planted the seed in beds, as is done in America, and when the plants had grown large enough to transplant, I prepared a piece of land by deep ploughing, and numerous cart loads of *old well rotted* manure, then dug holes three feet apart each way, forming a square, and filled them up with a mixture of manure and the dirt which was dug up; then took up the plant, with dirt adhering to it when practicable, and put one in the middle of the place just prepared, and watered it immediately by hand, to keep it from withering until we could finish transplanting the whole field, when I gave it abundance of water from the well. The transplanting was carried on late in the afternoon, and the watering continued during the night till completed. The plant grew most luxuriantly, without any perceptible check in its growth, it was well cultivated with the *plough* and *hoe*, and when I left home on the 1st of November, I never saw a better or more promising crop of the "*luxurious weed*" in any country, than it presented. As my *malee* had taken a great fancy to it himself, he continued to cultivate according to my directions, in my absence, but as I fear spoilt it in *curing*, which after *climate* and *soil*, is the great secret in making good tobacco, and in which process the natives here always fail, as well as in proper care of *suckering*, *topping* and *stripping*; but for my absence I should have had the pleasure to send you some fine specimens of that valuable product. I have a fine bed of young plants of the *Currani* and *Gibali* varieties which you sent me some time ago, and I hope to make a good sample this year.

The packet of cotton seed sent me last year, as "*Egyptian Cotton seed acclimated at Cawnpore*," proved to be degenerated *Sea Island*, which under the most favourable circumstances as it regards seeds, is unsuited to this part of the country, for I tried with pure fresh seed, and it is up here a poor miserable shrub, and worse cotton, and I consider it perfect folly to attempt to grow *Sea Island* cotton here, for reasons which I may hereafter explain if I have time. I believe I have reported upon all the seed forwarded me, except some of Dr. Thompson's cotton seed sent from Sydney, which I must take another opportunity to mention. I have samples of nearly all the varieties he sent you, which I will forward to the Society in due time.

I am most anxious to see the plough and the hoe adopted by all Europeans in their gardens, and particularly by Government and Agricultural Societies, as it appears to me to be useless to attempt improvements, and still allow the people to use their own rude instruments in their own rude way, when by adopting and persevering in a better system, we should save great expense in cultivating the gardens, and at the same time make the people more useful to themselves hereafter.

FORMATION OF AN AGRICULTURAL SOCIETY AT AGRA.

*Extract of a letter from Lieut WILLIAM MUNRO, H. M.'s 39th Foot,
dated Agra, 27th August, 1843*

I have not yet had the pleasure of corresponding with you, although with both your predecessors I had the gratification of doing so frequently. This has not, however, been occasioned by any want of zeal on my part in the cause of Agriculture and Horticulture, but because I really had not much of consequence to impart. We have established an Horticultural and Agricultural Society here, which is progressing quietly, but I think satisfactorily, and I am only waiting for the first meeting of the Society to send you a small account of our proceedings, and to request the assistance of your Society, but circumstances over which we had no controul have hitherto prevented that meeting taking place, and although when it does occur, I shall again do myself the honour of addressing you, I shall feel obliged if, in the mean time, you will mention at the next meeting of the Society of India, that we have established one here, which is very liberally supported, and that as yet our endeavours have met with success, and in the cultivation of cotton very great success. We shall be much obliged by your supplying us with any seeds that can be spared. We have the two foreign kinds of tobacco growing well, and also the Tinnevely senna, and Mr. Finnie, the American cotton planter, gave us some seeds which he procured from your Society, many of which, especially the American vegetables, have thriven remarkably well. Some Russian hemp seed which he had did not vegetate at all,

nor some coffee seed, but I have often in vain endeavoured to send coffee seed four 'days' dak, but never with success. With the exception of what I have mentioned above as growing, we shall be very much obliged for any seeds, particularly some Guinea grass seed

EXPERIMENTS WITH GUANO AT MAURITIUS.

Extract of a Letter from T. F. HENLEY, Esq. dated Calcutta, 18th August, 1843

It will be of some interest perhaps to lay before the Society the accompanying specimen of *Guano*, a substance which has been lately introduced into Mauritius, and applied to the cultivation of the sugar cane with eminent success

On a field to which it was applied, considered of such a poor soil as to be unsuited to the cane, it was applied at the rate of 400 lbs. per acre, mixed with 200 lbs. powdered charcoal, the results were fully equal to an application of the ordinary penn cattle and stable manure, in the usual ratio of about 15 tons per acre. Of its durability of power of sustaining the fertility of the field, I had no means of judging, having left the island in the interval. It is very probable that in this respect it will be found inferior to the slow decomposing stable compost. Its introduction must, however, be considered an improvement, as there is never sufficiency of stable manure for the extent of cultivation required annually on a sugar estate

This substance cost £20 per ton, landed from London in Port Louis.

It was applied twice. The first application, when the young cane had just sprouted; and at the commencement of the rainy season. The second application three months afterwards, also during rainy weather. The process of application being merely that of placing a small measure of the powder in each cane-hole, and mixing it well up with the surface soil.

Remarks on the state of Botany in Ceylon with reference to the knowledge of it in April 1843, and an attempt at arranging its Flora as known to Moon and resident Botanists according to localit and elevation, commonly called Geographical distribution of a Flora. By Captain CHAMPION, 95th Regiment.

On first arrival in Ceylon, our botanical griffin will feel very fairly puzzled as to what he is to regard as new and interesting in the vast mass of green jungle stretched before his wondering eyes. It may be that he can distinguish a cocoa-palm from a jack tree at first sight, and if he has common intelligence, he will shortly become acquainted with the mysteries of eating the various fruits served on the dessert table, and perhaps even enquire after the trees upon which they are produced, in which case I would recommend his consulting his black Appoo, as he may not always be successful in elucidating a correct answer from his companions of the preceding evening.

However this may be, a great deal is to be said respecting cocoa-palms and bettlenut, pumplenos and forbidden fruit, the bread-fruit, Indian-rubber tree, the banyan, cashew, and half a score more, and if he has not previously in England been the possessor of a little pucher plant, hermetically sealed and restricted to the last watering of the hot-house gardener for six months to come, this pretty plant may be pointed out to him as one of the wonders of the coast: but here knowledge closes her ample store, and if he has not perseverance to wade through Lindley, Moon, Wight and Arnott, Roxburgh, and a few other tomes, studded like the sands of the sea-shore with hard names, he will have finished his education in six months, and know as much of botany as most of his neighbours do.

Economy and utility are the order of the day. Who has been in the interior and seen sugar plantations and coffee gardens, and coolies clearing, until coolies are scarce, and will not say that Mammon is hard at work. There is nothing like English labor and industry, and this we will say with three cheers, whether in Ceylon, or the Park, or on the Thames with her forest of masts.

Ceylon is a money-making land, and many come out to make money and to live to save, but a few are here for a few years, and care less for money and more for agreeable society, and the many charms of the good old land; these regret to find but little of the dulce, and society at a low ebb, for we are all in the jungle, and just so many Robinson Crusoes with our man Friday.*

To the latter it will be no small pleasure to do as we have done in England. History, literature, and the arts can agreeably vary the usual routine of life; let me also suggest horticulture and her twin-sister botany, for its knowledge will enrich your grounds and house with many a pleasing object, and pass many a dull hour, whilst even the monotonous jungle becomes a source of delight.

I have not, however, sat down to persuade; in all countries horticulture and botany are charms to but a portion of the community, but to a sufficient number to become subjects of public attention, and even to attract the notice of Government, this is the age for botany as well as other pursuits. Kew re-established—and in the hands of the most accomplished botanist of the day—the princely green houses of Dropmore, Chatsworth, Woburn Abbey, and many noble residences. whilst foreign countries are ransacked by collectors for private green-houses or public societies. We find the late Duke of Bedford unporting from Mexico a waggon load of Cactuses, one of which, an Echmo-cactus, weighed upwards of two cwts., and had to be carried for some distance on the shoulders of eight Indians. Another (a Cactus-senilis) which some of us may have seen in England, was fourteen feet high. In Ceylon we know that the Duke of Northumberland has not been idle, he may possibly be better acquainted with its botany than our present residents. The *great Duke* himself can boast of the best avenue of beech trees in the kingdom at Strathfieldsay, (better even than Sir Walter's.) It is related of him, that when Loudon was engaged in the publication of his *Arboretum*, "he wrote for permission to take drawings from some of the
 " trees of Strathfieldsay, the Duke mistook the signature for that of
 " Chas. James, Bishop of London, (J. C. Loudon,) and supposing that the
 " Bishop patronised the science of botany, wrote to him that His Lord
 " ship might do what he pleased with the giants of his famous avenue, except cut them down. The Bishop we presume, must have been a good
 " deal puzzled with this limited Church commission. Poor Mr. Loudon
 " lost his chance." It is many years since Ceylon had attracted the attention of European botanists. The great author of the *Linneæan* system, with much taste and judgment, thus draws a comparison between the vegetation of Ceylon, and as it would appear, that of his own native country—Sweden: "A delicious climate has granted to this island
 " plants of such variety and value, that scarcely any soil can vie
 " with it for the abundance of its aromatic productions. Whilst
 " pine forests occupy our cold and sterile regions, in Ceylon the
 " cinnamon trees constitute whole groves, in such plenty indeed,
 " that the inhabitants are accustomed to employ the wood for house-

“hold furniture, for fuel, and for cooking. Our orchards are planted
 “with apples, pears, plums and cherries and other similar trees,
 “but in Ceylon nothing is esteemed save the lofty palms, among
 “which the cocoanuts chiefly afford the useful food, utensils and
 “every thing necessary to mankind. The Caryota there yields a
 “wine called Suri, and the Corypha or fan palm, extend their broad
 “smooth and plaited fronds, which serve for shade and shelter, they
 “are most requisite for protection from the sun’s rays, as well as
 “from sudden showers to the natives, whose only garment is a scanty
 “covering of lichen. Date palms and the superb bananas decorated
 “with wide spreading and glossy foliage, present in great profusion
 “racemes of the most delicious fruit, to say nothing of the more
 “valuable productions with which the soil is everywhere abounds, such
 “as mangoes, the jack, Malay apples, Pinea oranges, and citrons,
 “cashewnuts, avocados, &c. Our fields are sown with common barley
 “and rye, but those of the Singhalese receive nothing but rice,
 “which affords them flour and bread.” Our marshes are covered
 “with cattle, theirs with fragrant *Andromeda*. *Persicaria* occupy
 “our waste places; but with them grow different species of pepper.
 “In our meadows spring the *Ranunculus*, *Plantains*, *Convallarias*,
 “and many other neglected plants; in theirs numerous kinds of
 “*Hedysarum*, *Galega*, *Hibiscus*, *Justicia*, *Chelidonium*, *Impatiens*, *Andromeda*,
 “*Myrtle*, and *Ricinus*, besides numerous others as *Ipomoea*, *Bios-*
 “*coraea*, *Basella*, *Aristolochia*, *Ophioglossum*, *Phaseolus*, *Momordica*,
 “*Bryonia*, *Vine*, *Cissus*, *Pothos*, *Loranthos*, and *Acrosticum*. In the
 “room of the meadow-sweet and mints, the pastures in Ceylon are
 “scented with Basil, and the woods with Cinnamon. Everywhere
 “occur the most precious aromatics: as Ginger, Cardamoms, Galanga
 “Costus, Arcorus, *Schoenanthus*, *Calamus*, *Aromaticus*, and flowers
 “of the most exquisite color and structure and fragrance, such as
 “*Crimum*, *Panacratium*, and *Gloriose*, as well as those plants which
 “saturate the night air with their delicious scent, such as the *Tuberose*,
 “(*Polyanthus*), and *Nyctanthes*.” It was at this period that Burmann
 labored in Ceylon, and the results were “*Thesaurus Zeylanicus*,” a very creditable work at the period when published. Burmann lent his collection to Linnaeus, who published descriptions from it, as appears from Sir J. Smith’s tour on the continent in 1793. The same author also mentions Herman’s Ceylon Plants at Leyden and Copenhagen, and that a copy was afterwards published by Sir Joseph Banks. Sir J. Banks seems to have been interested in Ceylon botany, for Sir William Hooker studied in his museum preparatory

to going out with General Brownrigg; unfortunately family occurrences prevented this taking place. In Wight and Arnott's *Prodromus* of Indian botany, there is a very good account of the Indian botanists up to the time of Roxburgh; their works are of very little service in the present state of Indian botany, with exception of the edition of Roxburgh's *Indian Flora* by Wallich, which is very good. Royle, Wight and Arnott and Wallich are in India, what Hooker and Lindley are at home, and we owe to them a most complete knowledge of Indian botany: all their works are most instructive. Meanwhile to return to Ceylon botany. Moon, the first superintendent of the Botanic Gardens established at Paradenia, seems to have performed his duties in a most creditable manner. In 1824, he published a list of Ceylon plants, which is too well known in the island to require any recommendation; a few mistakes have crept in, and many of the genera have been altered since 1824; other plants are to be added, but still it is most useful up to the present improved age of the science. He must have formed a good Herbarium, but only a few plants are now extant, so that no means are left of ascertaining the plants which were undescribed in Moon's time, and consequently named by Moon; except by the Native names, and they are fluctuating, and not always correct where rare plants are in question.

Watson, Lear, and Normansell, who succeeded Moon, have done but little for Ceylon botany.

Previous to 1838, Colonel and Mrs. Walker paid great attention to Ceylon botany. Mrs. Walker had the advantage of being an excellent flower painter, and her tracings of plants are considered very beautiful. Their collection of plants went home to England in 1839 or 1840, and is supposed to have added a very large list to our Flora.

Dr. Wight was on a visit to Ceylon in 1839: he made an excursion with Colonel Walker, and collected above 500 species of plants. After this, a Mr. Nightingale collected for the Duke of Northumberland, and a Mr. MacRae seems to have been in the island: he has added to the grasses.

Mr. Bennett on his return from New South Wales visited Ceylon, and has published some interesting particulars on the different varieties of the cocoa palm.

The Flora of Java is quite unknown here. The researches of Blume, Reinwardt, Dr. Horsfield, and others, might enable us to ascertain several of the species not indigenous to India.

Finally, a Mr. Cumming brought an immense Herbarium of plants for sale from the Indian archipelago, about 1840, to London. A list of the

Ferns has been published, and probably contains many of the Ceylon species.

From the preceding remarks it will be observed, that whilst in 1812 the state of knowledge of botany in Ceylon was at a very low ebb, materials had gone to England which may have enabled botanists in England or India to form a very good estimate of our Flora, and indeed it appears that Lindley has drawn very largely on Ceylon for Orchideous plants, although our present list in Moon is very limited. The gardens are possessed of drawings of a very beautiful series of Ceylon plants, which cannot all be ascertained by the scanty references to be obtained from its indifferent library. Such is the state of our knowledge up to April 1843. But I have here the pleasing duty of remarking, that a few months may see a very improved state of our knowledge, as the Government has most liberally come forward in purchasing books of modern reference which have already arrived, and will shortly be open to the public. It is also expected, that the labours of Colonel Walker and the knowledge of Indian botanists will shortly be made known in Ceylon, and it is in contemplation to publish a corrected list of plants indigenous to the island. Possibly some years may elapse ere our knowledge is very complete, but it cannot fail that yearly much will be added to our Flora.

Botany is by many people considered a very dry study, and undoubtedly it is the grammar to horticulture, agriculture, and higher branches of a knowledge of vegetation, usually allowed to be important in the daily routine of life. To those interested in it as a pursuit, it opens a very curious field of observation in the structure of plants and for many other considerations; and those who have mastered its difficulties will turn their attention to all the higher branches of the subject with singular success, and unravel many of the mysteries of agriculture and commerce. I will briefly give a few instances: cinnamon and cassia have been known as articles of commerce from a very early period, as far back as some of the earlier Greek historians. As such our merchants are perfectly acquainted with their peculiarities, but not so with the sources from which produced. It is true that the Dutch had cultivated the true cinnamon plant, and so it was known how we got cinnamon; and it was certain that cassia came both from Ceylon and India, and must be known to those who had prepared it for the market. Now just about the period that cinnamon had begun to fall in value, people in England began to ask what cassia was; some said it came from a different tree from that producing cinnamon; others supposed it to be an inferior produce of the cinnamon tree, the tree allowed to

grow old, or the bark of branches of a different year's growth. Of course the old Dutch writers were referred to, and then it appeared that certainly there was a cassia tree, as well as a cinnamon tree; but when botanists began to look further, they found that scarcely two botanists agreed about the description of the cassia tree, although several had professed to describe it very correctly. Botanists in England began to fancy there might be many varieties of cinnamon or of the true cinnamon; so they got specimens of cinnamon and cassia and all the information they could on the subject, but just sufficient to leave a great deal to be said on both sides. In 1838, the question was at last taken up by the Madras Government, and they went to work by obtaining specimens of cinnamon and cassia, and reports upon them from the Government Agents of places where these articles were exported, and were also so assisted by Colonel Walker and the Ceylon Government. The reports were very conflicting and unsatisfactory, but fortunately Government had always insisted on specimens being sent, and these were placed in the hands of Dr. Wight. Dr. Wight and other botanists were aware that a great many species of cinnamon existed, and many of these had been described by either Roxburgh, Blume or the brothers Nees ab Essenbeck; so that although Dr. Wight could not in all instances determine the species sent, because they might be deficient in flowers or fruit, as the Government Agents might not in all instances be up to the requisites of a dried specimen for an Herbarium, yet in many instances he did discover what the species of cinnamon was as described in books or as new species, and hence he at last was able to settle the question very determinately, and cassia is found both to be an inferior preparation of the cinnamon tree, and also the better portions of bark of a great variety of cinnamon trees of different species, and which do not yield true cinnamon. Also that inferior cinnamons are produced in various parts of the Indian coast, and these are of species differing from the true Cinnamon of Ceylon. Dr. Blume enumerates in Java eleven species of cinnamon yielding aromatic barks, and several of these are said to vie with the very finest cinnamon of our market. Now I may here observe, that botany is certainly of some use. For when all the species shall have been described, and the English merchants are satisfied that there are other good cinnamons besides the true cinnamon, many of the under-rated cinnamons will be estimated at their proper value; and if a coffee planter should find a good deal of cinnamon on his estate, and can discriminate his species, he will be aware of its exact value whether as cinnamon or cassia by ascertaining the name.

A great many other instances might be cited with respect to our Medical Pharmacopœia. Drugs are purchased at a very high price from foreign countries, when it is probable that other species in our own colonies are possessed of similar qualities, which might certainly supersede the more expensive articles, where indigenous. Sarsaparilla is one, and various species of convolvulus of this country might produce jalap, without resorting to the Mexican or true jalap. It is only by a botanical knowledge of species, that we could impart such knowledge or discovery to the public.

Gamboge is another article of commerce, and there are gamboges of various qualities produced from different trees which require botanical discrimination. It created a good deal of attention a few years previous, and Colonel Walker was interested in the enquiry and in discovering the Ceylon species. Dr. Graham has at last settled the question determinately, and the true gamboge plant is found to be far more rare than the tree commonly supposed to produce the gamboge of commerce. The latter is very rare, and I believe not even indigenous to Ceylon, whilst the former (a common tree) produces a gamboge which would be scarce saleable.

Some good articles have been written in the periodicals and newspapers of our colony on articles of commerce or culture, and it is reasonable to suppose, that the Agricultural Society will do much for Ceylon on such points. It is also to be expected, that horticulture will extend through the exertions of individuals, and that our Paradema gardens on the new footing will yearly add to the taste for improving fruits and vegetables, and the introduction of foreign productions. Meanwhile it seems very desirable to ascertain the really indigenous Flora of Ceylon, and the peculiar features of certain localities. With this view I shall lay before the public a few hints towards the geographical distribution of our Flora, premising, that it has been made up from a very short experience, and from knowledge, derived from my want of modern works of botany, from the older authors up to the time of Moon and the Prodrômus of Wight and Arnott. As this is about the amount of knowledge of the usual run of residents in the island, it may serve as a ground work, until a better article on the subject from some more experienced hand shall have been published.

Geographical Division of Plants in Ceylon.

Part of the trees and plants in Ceylon (and these the most common in occurrence as forming the mass of vegetation) are found nearly

all over the island in favorable situations. Being of hardy growth, few are peculiar to Ceylon, but extend over India and the neighbouring islands; of such plants I have made a selection in Table 1st,* it includes many of the handsomer trees and shrubs of Ceylon. Many of these must be familiar to every resident. The soursop tribe, country almond, guava, jamboo, coronet-tree, ceiba or cotton, thespesia, Indian olive, pumplenos, lemon and orange, tree-spurge, coral, sappan, peacock-flower, horseradish-tree, baubimia, cashew, mangoe, mulberry, banyan, jack, bread-fruit, cassia, cinnamon, chaste-trees, teak, forbidden fruit, temple-flower, palmyra, betle-nut, jaggherry-tree, cocoa-palm, plantain, screw-pine, Indian rubber-tree, sago, papaw, bamboo, tamarind, castor, arnotto; with trees, shrubs and flowers of less specious appearance and many weeds. In some instances they have been introduced into hot-houses in England, but not universally; for what is most common in tropical climates is sometimes neglected to be sent home, and of this there is a very curious instance in the banyan. No foreign production has been oftener quoted than the banyan, both in verse and prose, by English writers, and it has been well described by both Cordiner and Roxburgh some thirty years ago, yet two of the most popular writers of the day, Ludley and Loudon, have confused it with the Bo-tree (*Ficus religiosa*) a very different species, and Moon in his catalogue with *Ficus Benghalensis*; it really being the *Ficus Indica*, and remarkable for its vast rooting branches, in which peculiarity it differs from both those other species of Fig. Major Forbes and the writer having sent Sir W. Hooker sketches of the banyan under the name of *Ficus Benghalensis*, Sir W. published a detailed account of this tree, correcting the above errors, and stating that he suspected that the English Herbaria are miserably defective in specimens of the true banyan. His own, rich in the productions of our Eastern possessions, had not a single specimen in March 1841, and Dr. Arnout had but one indifferent specimen. It is called manuga in Ceylon. On the subject of banyans, I will pass over Southey's beautiful description in the *Curse of Kehama*, and Colonel Sykes' famous tree in the Poonah collectorate, which has 68 stems descending from the branches, and capable of giving shade, but I will mention a circumstance which has lately struck me as curious. Somewhere in the Asiatic transactions, Sir Wm. Jones says, "it is true that minute ants are hatched in the ripe fruit of the Udumbara (or racemed Fig) whence it is named gamtephale; and the Pundits compare it to the mudane egg." Now although I have always looked upon

* The length of these tables precludes their insertion in this Journal.—Ed Journ. Agri-Hort. Soc. of India.

Sir W. Jones as a very enquiring personage and very clever man, I in this instance at once set him down as following the theories of the school of 1552, who believed that insects were *spontaneously produced* and therefore, not very much astonished, and not his opinion as rather curious with three of the accompanying marks (! ! !) exactly to denote my own opinion on the subject. We have the racemed Fig in Kandy, and I had seen the fruit, but I must say, that I never took any steps to investigate Sir Wm. Jones' theory. However, the other day I happened to bring home some of the fruit of the carpenter-fig, which I found growing on the root, and on opening some, I found they contained nearly a tea-spoonful of pure water, which is a curious instance of vegetable economy, and on opening another I discovered about a dozen ants inside. Now there was nothing remarkable in this had the fruit been penetrated, but on search I was obliged to confess that I could not discover any opening in any part of the fruit, and consequently it is no wonder that Sir W. Jones thought the Pundits really correct. How they entered I shall leave you to determine, but suppose that the economy of the parent insect is to introduce her eggs when the fruit is at a very early stage of growth, and that afterwards with the growth of the fruit the fissure becomes entirely obliterated. It is evident that the supply of water together with flowers and seed (all which are produced inside the fruit) are sufficient to support the ants, who are a very thirsty race. The Singhalese, who have naturally rather a turn for botany, and the appropriation of all sorts of trees and leaves to medicine and curries, believe that banyans have no flowers, and although you may not have sharper eyes than they have, and can hardly point them out in the tree, a botanist will shew a trick worth two of theirs, for on quietly turning the fruit inside out and attached to the inner skin, you will find either the flowers or the seed which they afterwards turn into.

To return to the distribution of the Ceylon Flora, many of the trees and plants commonly spread over the island are of great service and utility to the Natives and Europeans, either as timber, fruits, medicines, dyes or economical purposes. In many instances the properties are known, and have become available; but in other instances from what we read of respecting the use made of these trees and plants amongst certain tribes on the Continent of India or Burmese territories, it may be conjectured that they have been overlooked or neglected. Through the spirited exertions of individuals in the Company's service, most of these economical vegetable productions have been described under scientific names and descriptions, and consequently, when our Ceylon Flora is botanically named, we shall without difficulty avail ourselves of the ex-

perience thus to be acquired. The greatest exactness is often requisite in describing plants of common occurrence, to prevent error; for instance, much of the native steel of India is smelted by the use of a species of Mudar plant, the *Calotropis gigantea*, (a common plant in Ceylon,) and its root and bark is said by Lindley to be a powerful alterative and purgative, and of importance in cases of leprosy and elephantiasis; but later researches prove the Mudar plant to be a different plant; viz. the *Calotropis procera*, which is not known in this island, and it seems very doubtful how far the *Calotropis gigantea* (or curl flower) may share the qualities of the real Mudar plant. I think it was Dr. Wallich who published remarks on the real Mudar plant being the *Calotropis procera*. On the other hand, Mr. Wilkinson in February 1839, made known the native method of smelting steel; the ore used was magnetic oxide of iron, 52 to 48 of quartz, and was reduced in four hours by a furnace, to which was used charcoal fuel. Afterwards being placed in a crucible with dried wood of the *Cassia auriculata* and green leaves of the (*Asclepias*) *Calotropis gigantea*, and a certain process used, excellent steel is produced. If Mr. Wilkinson has made no mistake in this plant, there seems no reason why the natives here should not convert old iron into steel with facility, both plants being of common occurrence on the coast. It is not the intention of this paper to enter into the economical uses of the vegetable kingdom of the island. A very bulky volume might be produced on the many valuable resources that exist, and that are known and made use of by the natives of other countries. I restrict myself to the botany, with casual remarks, to shew, to how many objects of interest, use, or curiosity it will lead. Passing from Table 1, we come to the plants of the maritime provinces or sea coast of Ceylon. It seems to have been partially explored at Trincomalee, and Mr. Moon has visited Negombo, Putlam and Jaffna; but so very little is known respecting their Floras, that we are really inclined to look upon them as unexplored botanically, so that in reality Table 2 is merely that part of the coast extending from Colombo towards Galle, and it is supposed that the general features will extend to the whole coast of Ceylon, but will vary in certain localities. Putlam, for instance, having salt-water lakes, will have its peculiar characteristics in such localities, and Jaffna seems to differ considerably in climate and productions from the southern portions of the coast. In the neighbourhood of large rivers, it is possible that the productions of a more hilly country may casually occur, as transported in their seed vessels during floods and the monsoon season. However theoretical this view may at first appear, it is known to be practically correct to a small extent, and

that in this way volcanic islands and coral reefs become vegetated in the ocean, and islands thrown up by the embankment of sand in rivers. In connection with this subject, Lyell mentions, *Geology* vol. II, "Fruits indigenous to America and the West Indies, such as *Mimosa scandens*, the Cashew-nut and others," (all natives of Ceylon,) "have been known to be drifted across the Atlantic by the Gulf stream, on the western coast of Europe, in such a state that they might have vegetated, had the climate and soil been favorable; among these, the *Gurandina Bonduc*, a leguminous plant, is particularly mentioned, as having been raised from a seed found on the west coast of Ireland." The *Gurandina Bonduc* is very common all over the interior of this island. But although this is a proof of the very great distance that seeds may be floated without destroying in every instance the vegetating powers it does not seem sufficient for our purpose, and so I shall quote Mr. Darwin's description of the Keeling Lagoon Islands. He says, "I will now give a description of the Natural History of these islands which from its very paucity, possesses a peculiar interest. The cocoanut tree at the first glance seems to compose the whole wood, there are however, five or six other kinds, one of these grows to a very large size, but from the extreme softness of its wood is useless, another sort affords excellent timber for ship-building. Besides the trees, the number of plants is exceedingly limited, and consists of insignificant weeds. In my collection, which includes I believe nearly the perfect Flora, there are twenty species, without mentioning a moss lichen and fungus. To this number two trees must be added; one of which was not in flower, and the other I only heard of. The latter is a solitary tree of its kind in the whole group, and grows near the beach, where, without doubt, the one seed was thrown up by the waves. I do not include in the above list the sugar cane, banana, some other vegetables, fruit trees and imported grasses. As these islands consist entirely of coral, and at one time probably existed as a mere water-washed reef, all the productions now living here must have been transported by the waves of the sea. In accordance to this, the Flora has quite the character of a refuge for the destitute. Professor Henslow informs me, that of the twenty species, nineteen belong to different genera, and these again to no less than sixteen orders." Darwin also mentions again respecting another of these Islands—"The following seeds are supposed to be driven by the N. W. monsoon to New Holland, and from it to the islands by the S. E. trade wind. The *kimiri* of Sumatra and Malacca, the cocoanut of Baleri, the *dadass* of the Malays, also masses of Java teak and yellow-wood, and red and

white cedar, and the blue gum tree of New Holland. All creepers retain their vegetating powers; softer productions, as the mangosteen, do not germinate." In the tropics, where certain trees and plants grow over the margin of the ocean, and the young saplings often vegetate in the sand and mud both of it and of rivers, many may be supposed to be floated after storms far from their place of birth, whilst more inland productions are frequently transported by the agency of birds, or such as have winged seeds by the power of the winds. I can myself give what I believe to be an example of the agency of the Mahavillaganga. On the top of Adam's Peak and about Nuwera Ellia is found in abundance the gigantic *Lobelia excelsa*, a very handsome plant, attaining the height of 12 to 15 feet. It is a mountain plant, excluded from the jungles, but delighting in bare elevations and the sides of rocky streams. Its nearest approach to the low country is, I believe, Pusilawe and Ambegammie, growing in the latter country in great abundance on the banks of the river. A few months ago in passing the Trincomalee ferry, I observed this plant on the steep bank over-hanging the river, and I have little doubt but that the seed had been laid after one of the monsoons, when the river is much swollen and the plant in seed. After some experience of the Kandyan country, I am able to say, it is the only plant of this *Lobelia* growing in the neighbourhood. Upon the whole it seems probable, that several plants and trees may thus migrate to a colder climate; but they are constantly checked in growth where circumstances and climate are unfavorable by the mass of vegetation, hence only a certain number of hardy plants will succeed. The same may be said of plants introduced by the agency of man. Those of European growth rarely succeed in naturalising themselves in the low country, but South American are in many instances perfect weeds. *Asclepias curassavica* would really be believed to be an indigenous weed, had it no native name, and many of the productions of our gardens will be found in the same neighbourhood wild. Again at Nuwera-Ellia the Cape gooseberry, (*Physalis flexuosa*,) originally introduced, has spread with the greatest rapidity, and although a weed, contributes to the scanty resources for cookery in that part of the mountains. In every uncultivated country, plants best adapted to the climate of the place and soil will prove the more hardy, and will supplant the more delicate species. Thus in ascending mountains, vegetation will constantly vary first from the changes of the strata, and secondly because the atmosphere becomes colder as you ascend; but there are other causes. Vegetation depends much upon effects of light and solar influence. Leave a barren gravelly soil to itself, and it will first be covered with

sedge and grass, but when once weeds have effected a footing, many of these grasses will disappear, next will come under shrubs and creepers, so that the cleared space is again converted into jungle. Lastly, should trees also spring up by the time they have shaded the under-shrubbery from the effects of the sun's rays, it will have materially altered in character. From such causes, there must be a constant change of vegetation in mountainous countries, and also in the lower tracts; but more especially in the former. I have been informed by coffee-planters, that after clearing jungle, many plants and shrubs spring up which were not previously known in the forests, and it is easily accounted for on those principles. I have myself *Pavetta latifolia* from cleared coffee land, after in vain searching for it in the neighbouring jungle.

From this Table 2, it will be seen, that various fruit trees of the tropics thrive on the coast, which are less abundant or altogether disappear in the Kandyan country. The palm trees are also for the most part different. Cocoanuts thrive in the greatest perfection, and become the leading feature of the coast, sufficiently numerous to form topes; there are a considerable variety of the cocoanut-palm—they have been mentioned by Bennett and other writers. The features of the jungle present but little change for the extent of table land running sixteen miles into the interior, when the country changes and becomes hilly, and we are gradually brought into scenery, the component parts of which are mentioned in Table 3. It seems to be similar in its Flora to that of the Circar Hills in India. Of indigenous fruits of any value, there are few; but the fruits of China and the Archipelago and many vegetables are cultivated with success. The stranger will be struck with the tallipot tree and want of the cocoanut, except near villages, and also with the *Aleurites* or *Coekuna*, the foliage of which has the peculiarity of appearing white after rain amongst other jungle trees. Its nut is much used for expressing lamp oil by the natives. Two species of bramble will also be hailed as an approach to a colder climate. Most of the plants and trees in this table will be found on the under-features of the hills on the banks of the Mahavillaganga, whilst on approaching the higher hills, some of which are mountains 4,000 to 5,000 feet above the level of the sea, we come to a forest vegetation, the details of which are in Table 4. Trees are no longer in those heights festooned by *Convolvuli*, and *Ipomeas* and *Lorantie* are less numerous; but their place is supplied by many a lovely air-plant and the magnificent *Solandra oppositifolia*. On the summits of these hills are found beautiful and rare plants. *Begonias*, *Martynias*,

Didymocarpus, *Aginetia*, and *Acrotrrema* delight in the cold and shady precipices. The bottle-palm is here exchanged for a *Caryota* bristling with thorns. On reference to a map it will be observed, that the ridge of hills between Kandy and Gampolla extend towards Rambodda, so that most of the vegetation passed in travelling to Rambodda may be observed in a couple of hour's walk from Kandy to the top of its highest hills, which have nearly an elevation equal to that of Rambodda. Table 9 will, however, add a few other particulars, and leaves us now to comment upon the colder portions of the island or its highest mountains, in which examples are given of the Nuwera-Ellia Flora in Table 6, and the Flora of Adam's Peak in Table 7.

The Nuwera-Ellia country is a series of small plains, surrounded by hills and mountains thickly clothed with jungle to the very summit. Its elevation above the level of the sea is about 6,000 feet. Its highest mountain, the Pedro-talle-galla, rises to 8,000 feet. Its soil is very black and turfy in the plain, being either marshy or reclaimed marsh. The slopes of the hills turn into meadow land. Before reaching the jungle, a curiously disposed and natural hedge of shrubs intervenes, it extends with great regularity, and is a very peculiar feature in the country. It were erroneous to suppose that either the climate or productions of Nuwera-Ellia are European; but it is our alpine tract, and in losing the palm, the cinnamon, and a thousand of the ornamental trees and shrubs of the coast, we forget the tropics. In Europe the gradations of winter and summer have a most powerful effect on the system of all perennials. In winter the leaves fall, the tree is denuded of all its ornaments. In the mass of vegetation, the sap refuses to flow until the genial return of spring; the woody tissues harden and give rise to those concentric rings or zones, by which the carpenter can calculate the age of his timber. But as summer advances, the sap returning induces a fresh growth, and the formation of flowers and fruit. The absence of a well-defined winter is therefore the great difference between Nuwera-Ellia and our native land, and a simple answer to the query—"Why do not the large cherry trees of its gardens produce fruit?" In vain do we look for a single tree (unless introduced) of genera indigenous to our English climate: the trees, although not those of the coast, are still those of the tropics; they are however of harder growth, usually evergreen, and adapted to our Alpine region, where frost excludes delicate species, and the sun rarely shines except during the earlier months of the year. Analogy from such inferences leads us to expect the annuals of our summer which die

during the winter season and the plants of our marshes, and accordingly I have to mention genera familiar to the British botanist, intermixed with Alpine Indian plants. The sweet little har-bell is perhaps as grateful to us from association as the evening smoke of cottages rising over the jungle. The European genera are *Andromeda*, *Vaccinium*, *Ranunculus*, *Thalictrum*, *Anemone*, *Viola*, *Rubus*, *Frøgraria*, *Berberis*, *Scutellaria*, *Lysimachia*, *Polygonatum*, *Plantago*, *Lobelia*, *Cynoglossum*, *Alchemilla*, *Rhododendron*, *Magnolia*, *Potentilla*, *Hypericum*, *Impatiens*, *Monotropa*, *Neottia*, *Orchis*, *Drosera*, *Dipsacus*, *Valleriana*, *Utricularia*, *Campanula*, *Tradescantia*, *Oxalis*, *Polygala*, *Gnaphalium*, *Rhinanthus*, *Euphorbia* and some others; most of which have species growing in Great Britain. The character is scarcely Himalayan; but I am inclined to believe that its Flora accords so closely to the tract of land on the Neilgherries, that three fourths of either would contain the same species. We have not their rose, it is true, which is described as very beautiful festooning trees, but in either, the *Rhododendron nobile* forms the ornament of the plain. From the elevated portions of Java, there seems to be a marked difference in the absence of oaks and chestnuts, and of course of various other productions.

The plains of Nuwera-Ellia are very destitute of trees with exception of the *Rhododendron*. It is very beautiful when it flowers from May to July; the scarlet blossoms are relieved by the brown inside the bell of the Corolla, and by the silvery undersides of the stem leaves; at other seasons it is a dingy tree like the apple in height, with crooked, knotted trunk, varying from 10 to 15 feet, or even 25 and 30. When Arboreta shall have been introduced and villas in Nuwera-Ellia, we may expect gardeners to give us many pretty shrub varieties of this tree with English species. Lord Ciernarvon gained a celebrated new species by fertilising *R. Cataubriense* with the Himalayan sp. *R. Arboreum*. It retained the flowers and color of *R. Arboreum*, and had the leaves and hardness of constitution of *R. Cataubriense*.

I have already remarked that S. American species of plants become naturalised with great facility in the lower tracts of Ceylon—such is the case at Nuwera-Ellia with the productions of New Holland, and almost all the other trees of its plains have been introduced from that country by Europeans. Of the jungle trees, scarcely anything is as yet known, but some are doubtless those of the Kandyan hills, and of the rest a few, and these good ones, have been discovered. I was fortunate in finding an *Arboraceous vaccinium*, a species of *agapetes*, with pink flowers. A description of the genus will be found in a letter from Dr. Wight to Sir W. Hooker, dated Pulney mountains. There is a

beautiful tree creeper belonging to the Melastomaceæ, possibly a *Medinilla*, Blume; the balsams of those hills are certainly of 8 or 9 different species, some are of great beauty and size, and one species forms the entire under-shrubbery of many hills, as well as the *Nilla*, which is a didynamious plant. Air plants and magnificent ferns abound, and dwarf bamboos; on the rocks, mosses, and from the trees white mosses drenching in the drifting storms add to the wintry aspect. The *Kimo* tree, both red and white, is much used for firewood. I am not acquainted with its botanical name.

Europeans have cultivated several of our English vegetables with success, most however requiring to be renewed from England or the Cape after some years. Potatoes and cabbages are really a source of profit and of importance to the residents of the lower orders. The Cape gooseberry (now naturalised) makes an excellent tart fruit, with the wild bramble. English fruit trees probably require great care and particular mode of culture to produce fruit; hitherto retardation of the sap has not been attempted, or if so, unsuccessfully practised, but it seems to be the key to success. They should try fruit trees from New Holland and New South Wales and the raspberry and gooseberry from England.

Mr Stewart Mackenzie judiciously tried the introduction of the tea plant. I have not heard with what success, or what steps had been taken to insure the climate and locality it is used to.

From a perusal of Mr. Rolanson's account of the tea plant in Assam, the plant appears to be of hardy character with respect to climate; I am inclined to believe that that of the Kandyan hills would be very suitable, having very much the Assam style of vegetation—possibly better than Nuwera-Ellia. The great difficulty, however, exists in a locality. The requisites are excess of humidity amidst forests of dense jungle, where it grows in ravines and hollows near rivulets or pools of water. The soil should be light and porous, yellow or yellowish red over sand: it contains no carbonate of lime and the iron of the soil is almost wholly in a state of carbonate of iron—hence even in Assam and China, tea-soils are comparatively of rare occurrence. The plant requires much rain and a bright sun.

I am not aware that hops have ever been attempted to be introduced at Nuwera-Ellia, they surely would succeed. As the neighbourhood is becoming more populous, possibly a brewery might succeed.

That the grasses at Nuwera-Ellia are of very inferior quality seems notorious; but surely are capable of great improvement. Were their quality good, the country is well adapted for pasturage. Cattle and

horses have great animal spirits, and there are no leeches. Vetches of different kinds are also appropriate to the climate.

The Flora of Adam's Peak is probably entirely similar to that of Nuwera-Ellia; but not having level ground near the summit of the Peak, many of the meadow flowers have to be excluded, and possibly there are species which do not exist in the Nuwera-Ellia country, for instance a new *Monocera* or *Etiocarpus*, with purple fruit and entire leaves. The existence of species of *Magnolia* is an interesting feature. It however is probable, that all the Indian *Magnolias* should be classed with *Michelia*. The existing species, (two in number on the Peak,) have the type of *Magnolia pumila*.

It was my intention to have added a list of descriptions of rare plants not named by Moon, but those daily increasing, I shall reserve them for some future opportunity, when our knowledge of what has been done by Indian botanists is greater, which will prevent the confusion that might otherwise exist.

In conclusion, one word respecting the Government gardens. Let bye-gones be bye-gones, as is said in the North. Little undoubtedly has hitherto been done, and some of the leading requisites have been neglected, and the gardens require great attention and severe application from its new Superintendent to place them on the footing they ought to hold, but thanks to the liberality of our present Government, the aspect is beginning to change and order will soon subvert the many rare plants and trees which are at present unnamed, and consequently unknown, both in the gardens and in the beautiful series of drawings which have been amassed from time to time without name. Let us therefore hope to see *Peradenia* re-established, as *Kew* has been, in the 40's, and a taste for botany revive in the island, and when our Indian friends find we are really in earnest, they will not be backward in imparting to us the many treasures yearly added to their own gardens, and in shewing us how many neglected resources of wealth or utility exist in what is at present—UNRECLAIMED JUNGLE.—*From Report on the Royal Botanic Garden, Peradenia, near Kandy, from February to June, 1843.*

Kandy, May 29th, 1843.

On the Transmission of Cuttings to India.

About the first fortnight in August is the right time for taking the first steps for preparing grafts, or cuttings of fruit-trees, &c. destined to go by the overland mail, next November, to India or China, or to any

other of our distant possessions. For the manner of preparing such grafts, see the remarks at the head of the Calendar to-day, and others on the same subject, which I made this time last year, vol. ii., p. 558,* which have met the approbation of a gentleman of high physiological acquirements, who takes an active interest in all subjects tending to the general improvement of our East Indian territories; see* also vol. ii., p. 539,* and Number 14 of the current volume, p. 228;* to which I may add that I have the sanction of my worthy employers to prepare grafts here after the manner I suggest, and that I shall be glad to send them, carriage free, to London next October, in time to be packed for the November overland mail. I may further add, that I once unpacked a case of plants that had been lying seven months in a hot warehouse at Vera Cruz, and that some of the woody plants packed in saw-dust were still alive, after being packed full nine months; and I have little doubt but grafts of two years' old wood, if packed after the manner of those sent to India by the overland route, and placed in a large case of dry saw-dust, or in a bale of cotton, might be sent to India or China, round the Cape of Good Hope, in the bottom of a merchant vessel; and if care were taken not to excite them too much at first, there would be little danger of their success. In Dr. Gibson's letter of the 27th April, 1812, (vol. ii., p. 554), he says, "All the cuttings of the Jargonelle, &c. have rooted, and till the beginning of the hot season were flourishing. Since then they have drooped much, and I fear they will die." Now, it was natural enough to suppose that these cuttings were rooted, when they broke forth into leaf, but the chances are that none of them formed any roots at all. Indeed, from their arrival till the date of Dr. Gibson's letter, there was hardly sufficient time for their rooting, even in the climate of Bombay or Calabar, supposing they had arrived in as good a state as when they were packed in London. We have all of us seen analogous cases at home: the Elm and other deciduous trees, after being felled in the spring, break into leaf on the approach of summer, and keep green for five or six weeks, or till the leaves exhaust all the available sources of the parent tree, and then fade away, just as the above cuttings are reported to have done, after going through the same process; and in all probability the fate of the two Golden Pippin and one Duchesse d'Angoulême cuttings which reached Calcutta safe, will be reported by Dr. Griffith to have been the same, unless better precautions had been taken to insure their success than were used

* These remarks will be found at pages 329 and 432, vol. I. and at page 222 of vol. II. of this Journal.

towards those in the nearer stations of Calabar or Bombay; and if so, something further must be done for the safety of future trials. If one might suggest a gardening hint to our distant friends in the East, it would be this.—Plant the cuttings 2 inches deep, in very light soil, and press it about them so close that you could not pull them up without a good effort. The sun should not shine on your cuttings at any hour of the day, if this shaded situation is naturally dry, so much the better in your hot climate, but you must keep the soil always moist by watering after the rainy season. As soon as signs of vegetation begin, place a wooden box over the cuttings, about 15 inches high, with the bottom taken out of it, and glass or strong white paper, oiled, used instead; this will give them light enough at this stage. In England, we would place a hand-glass over them, but the wooden-box is preferable in your climate, being a powerful non-conductor of heat, which is just what your cuttings require. If you see the least dampness within the box, remove it, scrape away a little of the surface-soil all round, and sprinkle some dry earth or wood-ashes in its place, wipe the box dry, and turn it over them again. As soon as the young shoots are from 4 to 6 inches long, begin to let in air by placing a piece of wood under one corner of the box sufficient to raise it up 3 inches; but this is a critical period. If you see the leaves droop in the least you must let down the box again for another week, and afterwards begin with opening only one inch, which you will increase by degrees, as your tenderlings gain strength; but I should think you cannot dispense with the box altogether for five or six months, although you may take off the glass or paper top as soon as the leaves will endure a 6-inch opening under the box. Unless you have a good gardener, you should never plant your cuttings in pots, as they are liable to get either too dry or too moist—the natural moisture of the soil is more uniform and congenial for them.

That I might speak with more confidence on this subject, I began to make the same experiments here about this time last year, by preparing cuttings of Apples and Pears, which I planted in two aspects last November, on an east and north aspect—those on the north aspect are now a month in advance of the others. I did not think hand-glasses would be necessary in our cool moist climate. By the end of last May they began to leaf, and by the end of June you would have supposed by their appearance that they were well furnished with roots, but not a fibre was made at that time, and now they are only beginning to put out roots, and I shall send one of them along with this to show the state

they are in. Now, if this summer had been as hot and dry as the last, all my cuttings would have perished last June, unless I kept a cool moist atmosphere round them under a hand-glass.

The English reader will excuse me for going this length with a subject that might be privately reported to the parties interested, but as there may be others engaged in the same pursuit in other distant parts of the world, to whom any suggestions of this nature may be acceptable, the pages of this widely-circulated Journal seem the best channel for the purpose.—*D. Beaton.*—*Gardener's Chronicle*, August 5th, 1843

Guano, a new Manure.

Among the various substances which have been lately tried by English agriculturists as fertilisers of the soil, none appears to be more powerful in its effects than *Guano*, a manure recently imported from the *Guano* Islands on the coast of Peru. The state in which it is received into this country, is that of a fine brown or fawn-coloured powder, emitting a strong marine smell: it blackens when heated, and gives off strong fumes of ammonia.

It is in fact nothing more than the excrements of sea birds, which resort in vast numbers to the small rocky islands of the Pacific Ocean. Thus the soil of the islands Chinche, Ilo, Iza, and Arica, is covered with these excrements, and at Chinche alone, at the time when Humboldt wrote, fifty vessels were annually loaded with this manure, each trader carrying from 1500 to 2000 cubic feet. The manure thus collected is conveyed to the barren soil of Peru, where the finest vegetation and richest crops are obtained solely by its means. The guano is so astonishingly abundant, that it is said to form a stratum several feet in thickness on the surface of the islands.

Mr. Winterfeldt, writing on this subject, says, that the date of the first employment of guano as a manure is unknown, although no doubt exists of its great antiquity. In many parts of America where the soil is volcanic or sandy, there would be little or no produce without the aid of some such powerful fertiliser. It has been calculated that from 12,000 to 14,000 cwts. are annually sold in the port of Mollendo, for the use of the country round the city of Arequipa. In this district 3 cwts. of guano is spread over an extent of five thousand square yards (about an English acre). In the province of Taracapa, and in the valleys of Tambo and Victor, all kinds of trees and plants, with the

single exception of the sugar cane, are manured with the guano ; and in this district 5 cwts. are required to the acre.

There are three varieties of guano, bearing different prices, on the coast of Peru. The white guano bears the highest price, as it is fresher, purer, and less abundant than the other kinds, which are the red and dark-grey.

Sir Joseph Banks appears to have been one of the first in this country to direct attention to this extraordinary fertiliser. He said of it, "It answers the purpose of manure in a degree infinitely superior to any other article we have the knowledge of. A handful is considered as sufficient for several square yards of land, the produce of which is exuberant, in consequence of the force of this application." This strong recommendation of the guano was subsequently found to be perfectly justifiable.

The manure was first imported into England in 1810, by Mr. Myers, of Liverpool, and since that time the trials made by several individuals have been productive of the greatest success. But previous to this, it had undergone a set of the most elaborate experiments in the island of St. Helena, and its efficacy was abundantly tested as it respected the culture of potatoes, and the growth of grass. The late General Beatson, who made these experiments, found that the effect of the guano upon the grass lands was comparatively greater than with potatoes. On the 29th July, 1808, General Beatson marked out a space on the lawn, in front of Plantation House, St. Helena, which measured one rod in breadth and twelve rods in length ; this was divided into twelve equal parts or square rods, and numbered progressively from 1 to 12. The guano was reduced to a powder and sifted, and upon No. 1 a quart of this powder was evenly strewed by the hand. this is at the rate of five Winchester bushels per acre, because 160 square rods, or an acre, would have required that number of quarts, or exactly five bushels. In the same manner, No. 2 had two quarts, No. 3 three quarts, and so on, to No. 12, which had twelve quarts. From the 29th of July, there were daily drizzling rains until the 5th of August, when the effects of this invaluable manure began to appear. On the following day, the whole extent of the twelve rods became highly verdant, and exhibited such a contrast to the unmanured part of the lawn, that it had the appearance of having been newly turfed with a finer kind of sod. The effect gradually increased, and in the first week in October, that is, in little more than two months, the higher numbers, from 6 to 12, having from thirty to sixty bushels per acre, excited the surprise of all who saw them, being covered with the richest and most exuber-

ant grass that can be imagined, and having more the appearance of a crop of young wheat very thickly sown, than of any grass previously seen. This was the more remarkable, as the copious rains which fell in August and the spring season had made no visible effect on the adjoining part of the lawn. From a frequent and careful inspection of these experiments, General Beatson estimated thirty-five bushels of guano per acre to be equivalent in effect upon grass lands to seventy loads of well-rotted dung. He says—

I have been informed that guano is sold at Lima, and at other towns on the coast of Peru, for a dollar a bag of fifty pounds weight, and that it is much in use for manuring fruit trees and gardens. It is certainly one of the most powerful of manures, and therefore it is necessary to be cautious in using it. I have observed when too much is laid on grass, that it burns and destroys it. I would therefore recommend to those who may try it on fruit trees, to begin with not more than three-quarters of a pint to each tree, and to trench it about a foot deep all round the roots. If the first application be found insufficient, a second or third may be given at intervals of two or three months, or a better mode, perhaps, of determining the quantity of guano proper for each fruit tree, would be to select about a dozen trees of the same kind and size, and to vary the quantities by an easy progression, from three-quarters of a pint to one or two quarts, or more, to each tree.

The guano manure has now been tried in several parts of England, and always with good effect, though in some cases the results have not been such as were anticipated, on account of an over-estimate of its powers, and the consequent employment of too small a quantity. There are notices in the *Farmer's Magazine* of some satisfactory experiments with this manure. Mr. Smith, of Gunton Park, Norfolk, applied 200lbs. of guano to an acre, and on the same field, on an equal space of land, fifteen bushels of bone-dust. Both were drilled into the ground with seed-wheat. The bone-dust gave four and a half quarters of wheat, the guano six quarters two bushels, one and a half pecks. Mr. Love, of Shoreham, Sevenoaks, relates that he mixed 14lbs. of guano with two bushels of ashes, and although the weather was very dry, he perceived a marked difference in the growth of the plants a few days after they were put in. Encouraged by this, he then mixed 28lbs. with 15 bushels of ashes and applied it for turnips, by sowing broadcast on the land, and harrowing it in lightly. The seed soon vegetated, and the plants grew away from those manured with dung and mould. In each case the guano was applied at the rate of two cwt. to the acre. Mr. John Crane Nott, of Hallōw, Worcestershire, gives the

result of his trial of this manure on hop-grounds. In order to give it a fair trial, he put about a pint to every alternate mile in each row; and the effect was most extraordinary: Those hills on which the guano was applied were most luxuriant; while the adjoining ones not so manured were sickly and weak.

Thus it appears that a valuable fertiliser is added to the manures already employed by the English farmer; but it is probable that its powers have been in some instances exaggerated. From two to four hundred weight per acre must be considered as the smallest quantity that should be applied by drill. Like most other articles of high price, it has become subject to adulteration.—*The Saturday Magazine*, 10th December, 1842.

Monthly Proceedings of the Society.

(Wednesday, the 13th September, 1843.)

William Griffith, Esq. Vice President, in the chair.

Members Elected.

The gentlemen proposed at the last meeting were duly elected Members of the Society, viz :—

Capt. Arthur Hall, Talib Ally Khan, Lieut. John C. Brooke, Messrs. J. P. Cazenave, John Knott, Henry Mornay and Henry Lemarchand.

For Election.

The names of the following gentlemen were submitted as candidates for election :—

As an Honorary Member.

Dr. Justus Liebig,—proposed by Mr. L. Wray, seconded by Mr. W. Haworth.

As Ordinary Members.

Lieut. Edward Close, 32nd W. I., Dinapore,—proposed by Lieut. H. C. James, seconded by Mr. W. Quintin.

Baboo Obeychurn Mullick, Deputy Collector, Jessore,—proposed by Mr. Samuel Smith, seconded by Mr. C. Steer.

C. C. Jackson, Esq., Civil Service, Agra,—proposed by Lieut. W. Munro, seconded by Lieut. W. Abercrombie.

Baboo Kissubchunder Roy,—proposed by Mr. G. F. Remfry, seconded by Baboo Cossinauth Dutt.

Capt. Henry Cotton, Deputy Judge Advocate General, Saugor Division,—proposed by Mr. Adam F. Smith, seconded by Mr. L. Balfour.

T. H. Lakin, Esq., Merchant, Calcutta,—proposed by Mr. James Small, seconded by Mr. M. A. Bignell.

J. O. Price, Esq., Govt. Cotton Planter,—proposed by Mr. L. Wray, seconded by the Secretary.

Richard Dodd, Esq., Merchant, Calcutta,—proposed by Mr. Andrew Hay, seconded by the Secretary.

Presentations to the Library.

1. Six copies of a Report on the Royal Botanic Garden at Paradinea, near Kandy, by Wm. Charles Ondaatje, Acting Superintendent.—*Presented by the Ceylon Government.*

2. Journal of the Asiatic Society of Bengal, No. 49 to 54.—*Presented by the Society.*

3. The India Journal of Medical and Physical Science, No. VIII. of Vol. I.—*Presented by the Proprietor.*

4. The Indian Record and Planters' Journal, No. 48 to 57.—*Presented by the Proprietor.*

5. The Calcutta Literary Gleaner, No. VII. of Vol. II.—*Presented by the Proprietor.*

Museum.

1. A sample of tea grown and manufactured at Chittagong.—*Presented by Mr. Sconce.*

Mr. Sconce mentions, that this tea was made from leaves of Assam plants, of which he got a supply, through the kindness of Major Jenkins, about three years ago. The soil on which these trees are planted, Mr. Sconce describes as very sandy, nevertheless, many of the bushes have shot up to a considerable height, six, eight, and ten feet. Instead of being manufactured in iron pans, as by Mr. Bruce's account they should be, these leaves, Mr. Sconce states, were prepared in earthen dishes, over a kitchen fire.

Mr. Sconce adds, "I am this year gathering a considerable quantity of seed, and, what I prize very much, *three* China tea plants, which I got from Dr. Wallich, are also giving seed. It seems to me that the enquiry as to the difference between the Assam and China plant (practical difference as regards Tea drinkers—if not essential

difference as regards Botanists) has not been prosecuted as it ought. To look at the leaves of the plants are very different, and even the seeds of my three China plants, which are growing close together, differ, the seeds of one bush from the seeds of another, most perceptibly in form, size, and general appearance."

The Secretary mentioned that he was unable to submit a report on this tea on the present occasion, but hoped to obtain one, to be laid before the next meeting.

2.—Five specimens of raw silk, produced and reeled at Bangalore.
—*Presented by Dr. C. T. Smith.*

Referred to the silk Committee.

(For further particulars, see body of the Proceedings.)

3. A large supply, consisting of 22 maunds of New Orleans cotton seed, and 3½ maunds of Bourbon seed, acclimated at the Government Cotton farm at Coimbatore.—*Presented by Dr. R. Wight.*

The Secretary informed the Members that the whole of this supply had reached in excellent condition.* A few seeds were put in the ground immediately on their arrival; and every one had germinated in less than four days.

[Members, or others desirous of trying this seed in Bengal, are recommended to lose no time in applying for it, as the season for sowing cotton is so near at hand.]

4. Specimen of wheat grown at Bolundshahur from Egyptian seed.—*Presented by Mr. Thos. Tonnochy.*

[Some notice of this wheat will be found further on.]

5. A fine assortment of seeds collected by him in Affghanistan, consisting of lucerne, clover, melon, peach, apricot, lettuce, beet, onion, &c.—*Presented by Major Wm. Anderson.*

On the proposition of Mr. Griffith, seconded by Mr. Storm, it was resolved,—That the best acknowledgments of the Society be given to Major Anderson for this most acceptable contribution.

6. Specimens of Dyeing Lichens, the produce of Mauritius and Madagascar, and specimens from the Cape de Verdes for comparison.
—*Presented by Mr. T. F. Henley.*

7. Samples of cotton from the Shahabad District, and a sample from his garden at Patna, all of them the produce of New Orleans seed.—*Presented by Mr. C. E. Ravenshaw.*

8. Seed of the large pomegranate, exhibited at the last meeting.
—*Presented by Captain Earle.*

9. A specimen of Guano, *Presented by Mr. Henley.*

Carey Testimonial.

A final report from the Finance Committee, drawn up in accordance with the resolution passed at the last meeting, was next submitted. The Committee state, that after paying all the necessary minor expences, amounting to Rs. 107, there is a balance in the Bank of Bengal to the credit of the Testimonial, of Rs. 1448. From this sum they suggest, that a bill for £120 be remitted to Dr. Royle, and that he be solicited to make arrangements for carrying into effect the wish of the Society, in procuring a marble bust of the late Dr. Carey. The Committee further recommend, that the balance, Rs. 240, or thereabouts, be retained in the Bank to meet the charges consequent on the transmission of the clay bust, now to be forwarded from hence to Dr. Royle, and also to defray the expense of freight, &c., on receipt of the marble bust from England.

The report was confirmed.

Horticultural Exhibition in October.

A Report from the Fruit and Kitchen Garden Committee was next read.—The Committee suggest, that with reference to the lateness of the season, the Horticultural exhibition, which it was originally proposed should be held in the early part of October, be delayed till the 28th of that month. The Committee submit three schedules of prizes, to the amount of 200 Rs. for the best specimens of such fruits and vegetables, foreign and indigenous, as they deem most deserving of encouragement.

The Report of the Committee was confirmed, and early notice of the day appointed for the exhibition. &c., was directed to be given to the native gardeners.

Report on a Black Vegetable Dye, from the Shan country.

The paper that was next submitted was a report from Dr. Mouat, on the sample of black vegetable dye which was procured from the Shan country by Messrs. Landers and Warwick, and presented at the June Meeting of the Society. (See page 205.)

Proposed by Mr. Griffith, seconded by Mr. Wm. Storm, and unanimously resolved,—That the best acknowledgments of the Society be tendered to Dr. Mouat, for the trouble he has taken in making these experiments, and for his kindness in drawing up this report. The report, as also the communications of Messrs. Landers and Warwick, were transferred to the Committee of Papers.

Cultivation of American Cotton at Patna, and in the Shahabad district

The Secretary desired to submit an interesting communication from Mr. Ravenshaw, Commissioner of Patna, forwarding a Report and Tabular Statement from Mr. Field, Sub Deputy Opium Agent at Shahabad, shewing the result of an experiment to introduce the Mexican and New Orleans cotton seed into that district. Mr. Ravenshaw's paper is accompanied by the samples of cotton before alluded to among the presentations. (See page 197.)

The best thanks of the Society were directed to be given to Mr. Ravenshaw for these communications, which were transferred to the Committee of Papers for the Journal. The samples were made over to the Cotton Committee for report.

The Cacao Plant.

The Secretary stated, that in accordance with the resolution passed at the April meeting of the Society, to the effect that he should place himself in communication with Mr. Stikeman, Secretary of the East India and China Association, with the view of obtaining some pods of the Cacao or Chocolate nut from the West Indies or Brazil, he had lost no time in addressing Mr. Stikeman on the subject, and now begged to read the following reply, received by the last mail, from that gentleman :—

JAMES HUME, Esq.

Honorary Secretary, Agricultural and Horticultural Society, Calcutta.
London East India and China Association, No. 2, Cowper's Court, Cornhill 30th June 1844.

SIR,—I beg to acknowledge your letter of the 20th April, received by the last overland mail, on the 10th instant, expressing a wish that this Association should endeavour to procure from the Islands of Trinidad or Grenada, or from the northern parts of Brazil, (for transmission to Calcutta,) some pods of the Cacao or Chocolate nut; and I lost no time in laying your request before this Committee, and by their direction wrote to the Colonial Office on the subject, in the hope and expectation that H. M. Government would, under the circumstances stated, viz. that this Association had no Correspondents in the West Indies or Brazil, consent to write to the Governors of the above Islands or the British Consul in South America to obtain what might prove so advantageous to India. I have since received Lord Stanley's reply, and it is with great regret I have to announce to your Society, that his Lordship declines to interfere. I give you copy of his letter on the other side.

You will be pleased not to consider this Committee's exertions at an end ; for although they have no communication with any other places than those in India and China, and *no funds* for purposes of the kind, yet I will see if the thing cannot still be accomplished.

I am, Sir,

Your obedient humble Servant,

JOHN STIKEMAN.

Colonial Office, 24th June, 1843.

SIR,—I am directed by Lord Stanley to acknowledge the receipt of your letter of the 14th instant, soliciting, on behalf of the East India and China Association, a supply of the Pods of the Cacao or Chocolate Nut from the Islands of Trinidad or Granada, accompanied by instructions with regard to the time of planting the seed, the soil best suited for it, &c.

Lord Stanley desires me to state to you in reply, that his Lordship would be very happy to afford you every facility in promoting the object you have in view ; but that he does not think that he could with propriety impose such a duty on the Governors of H. M.'s Colonies.

I am, &c.,

(Signed) GEO. HOPE.

TO JOHN STIKEMAN, ESQ.

Resolved. That the best thanks of the Society be given to the Association for their kind and prompt endeavours to meet the wishes of the Society, and for their further promise of assistance.

In connection with the subject, the Secretary submitted the following extract of a letter with which he had been lately favored by Mr. Sconce :—

“ A reference was made at a late monthly meeting of the Society to the *Cacao*, and perhaps it may interest you to know that the plant has been introduced here (Chittagong) by Captain Marquard. This year, for the first time his plant (only) produced ; and I have now eight or ten plants growing from one of the pods. Captain Marquard is now absent, but I am sure if it be wished, he will be happy to make over part of next year's produce to the Nursery of the Society or to the Botanic Garden. Is the *Cacao* not to be found in the Botanic Garden now ?”

In reply to the above query, Dr. Griffith mentioned, that there are a few plants of the *Theobroma Cacao* in the Botanic Garden, but they are all poor, stunted and partly decayed, and ripen fruit but sparingly. In reference to Mr. Stakeman's letter, he had the pleasure to inform the members, that Dr. Royle having heard of the difficulty which the China Association had experienced, intended sending some Cacao pods to the Society by an early opportunity.

Establishment of an Agri-Horticultural Society at Agra.

The Secretary intimated, that since the last meeting, he had received a letter from Lieut. Munro at Agra, announcing the gratifying circumstance of the establishment of an Agricultural and Horticultural Society at that station. Lieut. Munro mentions, that the Society was formed in the early part of the year, but various circumstances have combined to prevent a formal communication on the subject to the Agricultural Society of India. He intends, however, after the first general meeting, to send some account of their proceedings. In the meantime he has the pleasure to intimate, that the Society is progressing, although quietly, he trusts satisfactorily, that it has been very liberally supported, and their endeavours for the culture of various products have met with success. Lieut. Munro requests to be furnished with any seeds for the Agra garden that the Society can afford to give.

It was unanimously *resolved*, that the request of the Agra Society be complied with.

Experiments with Guano at Mauritius.

With the sample of *Guano* referred to among the presentations, the Secretary mentioned that Mr. Henley had been kind enough to afford some particulars regarding experiments which have been made on sugar cane lands at Mauritius, (See page 370) with this powerful and much prized manure.

Progress of Silk Cultivation in the Mysore Province.

The next communication submitted to the meeting was an interesting letter from Dr. C. T. Smith at Bangalore, forwarding the samples of Silk alluded to among the presentations. Dr. Smith reports that the Silk culture is doing very well, and giving employment to the Mahomedans all over Mysore. From the samples mark-

ed Nos. 4 and 5, Dr. Smith mentions, the natives manage to make some very handsome Silks, and are improving every year. For sample No. 1, which is by far the best, Dr. Smith states, he is indebted to the Society.*

Dr. Smith mentions that the Mysore Government have established a small experimental Silk farm, more with the view of teaching the natives how to reel Silk, and also the advantages they would derive by taking some trouble to do it carefully. Dr. Smith adds, "we are also introducing the better kinds of Mulberry and Standard trees, but it is sad up-hill work to get the natives to alter their old established customs."

Formation of a Public Garden at Budaon.

Mr. Williams, the Magistrate of Budaon, communicates the formation of a public garden at that station.

Mr. Williams says, "the residents of this station have followed the good example set them elsewhere, and established a garden here, with a view to promote the introduction of a better system of agriculture, better seeds, and better implements into the district, and naturally turn to your Society, which has done so much good, to assist us." The Secretary intimated, that on receipt of the letter of Mr. Williams, he had lost no time in meeting his request, and had despatched a large assortment of seeds.

Distribution of Europe Wheat and Barley.

The Secretary stated, that as directed at the meeting in July, he had distributed the varieties of Wheat and Barley, which were forwarded by Dr. Royle, to several members of the Society. He had now the pleasure to submit letters from Mr. Tonnochy at Bolundshahur, Mr. Finnie at Agra, Major Napleton at Bhauglepor, Mr. Muller at Patna, and Mr. Palmer at Monghyr, acknowledging the receipt of the seeds, and promising to give them their best attention. Colonel Sleeman had transferred the varieties which were forwarded to him, to Major Macadam at Jubbulpore. He states, "Major Macadam will there be able to see that justice is done to them, which I could not here, as I shall leave Jhansee about the seed time. If

* A supply of eggs was sent last year to Dr. Smith, at his request. See Journal of the Society, No. III. of vol I, page 196.—SE.

they succeed, they will be most valuable to the a Saugor territories where a change of seed is much wanted.

The Sugar Planter's Companion.

The Secretary drew the attention of the meeting to some articles, from the pen of Mr. Wray, which have lately appeared, and are still in course of publication in the Society's Journal, under the designation of the "Sugar Planter's Companion." Mr. Wray, he would mention, had informed him of his intention of publishing the work, very shortly, in a separate form. He now alluded to the circumstance, as the Society might probably be disposed to give some little support to the publication. On the proposition of Dr. Griffith, seconded by Mr. Strickland, it was unanimously agreed that the Society do subscribe for six copies of Mr. Wray's work.

Communications on various subjects.

The following letters and papers were likewise submitted :—

1. From Dr. Alexander Gibson, Supt. of the H. C. Botanic Garden at Dapoorie, (Bombay Presidency,) forwarding an interesting and useful paper regarding the culture of the Senna plant under his superintendence.

2. From Captain G. Hollings, reporting the result of trials made in the public garden at Lucknow, with Cotton, Hemp and other seeds, obtained from the Society.

3. From Dr. Robert Wight, affording further particulars regarding the cultivation of Cotton at the Government experimental farms at Coimbatore.

4. From Mr. T. J. Finnie, dated Agra, August 20, giving the result of trials with Cotton, Hemp, Tobacco, Vegetable, &c. seeds. Regarding the American vegetable seeds, Mr. Finnie thus writes :—

"The small packet of American vegetable seeds you so kindly sent me the other day arrived safe; as my garden was not ready for their reception, I made them over to the Secretary of our Agricultural Society here, and they were planted in the Society's garden and have come up beautifully, without a single exception, I believe, and are now growing as finely as this weather will permit, (we have had no rain since the 29th ultimo,) of their progress and result I will inform you hereafter.

5. From Mr. T. F. Henley, submitting a memorandum on the Dyeing Lichens of Mauritius and Madagascar.

The above five papers were referred to the Committee of Papers.

6. From Major T. E. A. Napleton, Secretary Branch Agricultural Society of Bhaugleypore, returning thanks for the two silver medals and fifty rupees which were voted at the last meeting for the use of their Institution.

7. From Dr. C. T. Smith, dated Bangalore, August 17, requesting to be furnished with a quantity of Sissoo seed. Dr. Smith states, that the supply that was furnished him last year by the Madras Agricultural Society has succeeded so well, that he is induced to apply to the Bengal Society for a supply, knowing that the Government are desirous to introduce the tree, and observing that it appears to take readily to the soil and climate of Mysore. Dr. Smith adds, that several of the trees in his garden, the produce of seed sown in August, last year, are now upwards of 6 feet high.

8. From Mr. T. F. Henley, intimating his readiness to meet the wish of the Society in procuring seeds of the *Pandanus Vacoa* and *Talfairia pedata*, from Mauritius.

For all the foregoing papers and presents, the best thanks of the Society were accorded.

eteorological Register kept at the Surveyor General's Office
Calcutta, for the Month of August 1843

Company's Office

Observed at 9 H 50 M. Observed at 4 P M. Rain Gauge. Observations made at 8 P M. Observations made at 10 P M.

Moon's Changes	Temperature.			Wind.			Temperature.			Rain Gauge.			Temperature.			Barometer.			Temperature.			Barometer.			Temperature.			Barometer.		
	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.	Barometer.	Of the Air.	Of the Mer.
1	29.56	83.5	82.1	29.55	83.0	80.8	29.55	83.0	80.8	0.16	...	...	29.55	83.0	80.8	29.55	83.0	80.8	29.55	83.0	80.8	29.55	83.0	80.8	29.55	83.0	80.8	29.55	83.0	80.8
2	29.59	83.5	82.1	29.58	83.0	80.8	29.58	83.0	80.8	0.16	...	...	29.58	83.0	80.8	29.58	83.0	80.8	29.58	83.0	80.8	29.58	83.0	80.8	29.58	83.0	80.8	29.58	83.0	80.8
3	29.61	83.5	82.1	29.60	83.0	80.8	29.60	83.0	80.8	0.16	...	...	29.60	83.0	80.8	29.60	83.0	80.8	29.60	83.0	80.8	29.60	83.0	80.8	29.60	83.0	80.8	29.60	83.0	80.8
4	29.64	83.5	82.1	29.63	83.0	80.8	29.63	83.0	80.8	0.16	...	...	29.63	83.0	80.8	29.63	83.0	80.8	29.63	83.0	80.8	29.63	83.0	80.8	29.63	83.0	80.8	29.63	83.0	80.8
5	29.67	83.5	82.1	29.66	83.0	80.8	29.66	83.0	80.8	0.16	...	...	29.66	83.0	80.8	29.66	83.0	80.8	29.66	83.0	80.8	29.66	83.0	80.8	29.66	83.0	80.8	29.66	83.0	80.8
6	29.70	83.5	82.1	29.69	83.0	80.8	29.69	83.0	80.8	0.16	...	...	29.69	83.0	80.8	29.69	83.0	80.8	29.69	83.0	80.8	29.69	83.0	80.8	29.69	83.0	80.8	29.69	83.0	80.8
7	29.73	83.5	82.1	29.72	83.0	80.8	29.72	83.0	80.8	0.16	...	...	29.72	83.0	80.8	29.72	83.0	80.8	29.72	83.0	80.8	29.72	83.0	80.8	29.72	83.0	80.8	29.72	83.0	80.8
8	29.76	83.5	82.1	29.75	83.0	80.8	29.75	83.0	80.8	0.16	...	...	29.75	83.0	80.8	29.75	83.0	80.8	29.75	83.0	80.8	29.75	83.0	80.8	29.75	83.0	80.8	29.75	83.0	80.8
9	29.79	83.5	82.1	29.78	83.0	80.8	29.78	83.0	80.8	0.16	...	...	29.78	83.0	80.8	29.78	83.0	80.8	29.78	83.0	80.8	29.78	83.0	80.8	29.78	83.0	80.8	29.78	83.0	80.8
10	29.82	83.5	82.1	29.81	83.0	80.8	29.81	83.0	80.8	0.16	...	...	29.81	83.0	80.8	29.81	83.0	80.8	29.81	83.0	80.8	29.81	83.0	80.8	29.81	83.0	80.8	29.81	83.0	80.8
11	29.85	83.5	82.1	29.84	83.0	80.8	29.84	83.0	80.8	0.16	...	...	29.84	83.0	80.8	29.84	83.0	80.8	29.84	83.0	80.8	29.84	83.0	80.8	29.84	83.0	80.8	29.84	83.0	80.8
12	29.88	83.5	82.1	29.87	83.0	80.8	29.87	83.0	80.8	0.16	...	...	29.87	83.0	80.8	29.87	83.0	80.8	29.87	83.0	80.8	29.87	83.0	80.8	29.87	83.0	80.8	29.87	83.0	80.8
13	29.91	83.5	82.1	29.90	83.0	80.8	29.90	83.0	80.8	0.16	...	...	29.90	83.0	80.8	29.90	83.0	80.8	29.90	83.0	80.8	29.90	83.0	80.8	29.90	83.0	80.8	29.90	83.0	80.8
14	29.94	83.5	82.1	29.93	83.0	80.8	29.93	83.0	80.8	0.16	...	...	29.93	83.0	80.8	29.93	83.0	80.8	29.93	83.0	80.8	29.93	83.0	80.8	29.93	83.0	80.8	29.93	83.0	80.8
15	29.97	83.5	82.1	29.96	83.0	80.8	29.96	83.0	80.8	0.16	...	...	29.96	83.0	80.8	29.96	83.0	80.8	29.96	83.0	80.8	29.96	83.0	80.8	29.96	83.0	80.8	29.96	83.0	80.8
16	30.00	83.5	82.1	30.00	83.0	80.8	30.00	83.0	80.8	0.16	...	...	30.00	83.0	80.8	30.00	83.0	80.8	30.00	83.0	80.8	30.00	83.0	80.8	30.00	83.0	80.8	30.00	83.0	80.8
17	30.03	83.5	82.1	30.03	83.0	80.8	30.03	83.0	80.8	0.16	...	...	30.03	83.0	80.8	30.03	83.0	80.8	30.03	83.0	80.8	30.03	83.0	80.8	30.03	83.0	80.8	30.03	83.0	80.8
18	30.06	83.5	82.1	30.06	83.0	80.8	30.06	83.0	80.8	0.16	...	...	30.06	83.0	80.8	30.06	83.0	80.8	30.06	83.0	80.8	30.06	83.0	80.8	30.06	83.0	80.8	30.06	83.0	80.8
19	30.09	83.5	82.1	30.09	83.0	80.8	30.09	83.0	80.8	0.16	...	...	30.09	83.0	80.8	30.09	83.0	80.8	30.09	83.0	80.8	30.09	83.0	80.8	30.09	83.0	80.8	30.09	83.0	80.8
20	30.12	83.5	82.1	30.12	83.0	80.8	30.12	83.0	80.8	0.16	...	...	30.12	83.0	80.8	30.12	83.0	80.8	30.12	83.0	80.8	30.12	83.0	80.8	30.12	83.0	80.8	30.12	83.0	80.8
21	30.15	83.5	82.1	30.15	83.0	80.8	30.15	83.0	80.8	0.16	...	...	30.15	83.0	80.8	30.15	83.0	80.8	30.15	83.0	80.8	30.15	83.0	80.8	30.15	83.0	80.8	30.15	83.0	80.8
22	30.18	83.5	82.1	30.18	83.0	80.8	30.18	83.0	80.8	0.16	...	...	30.18	83.0	80.8	30.18	83.0	80.8	30.18	83.0	80.8	30.18	83.0	80.8	30.18	83.0	80.8	30.18	83.0	80.8
23	30.21	83.5	82.1	30.21	83.0	80.8	30.21	83.0	80.8	0.16	...	...	30.21	83.0	80.8	30.21	83.0	80.8	30.21	83.0	80.8	30.21	83.0	80.8	30.21	83.0	80.8	30.21	83.0	80.8
24	30.24	83.5	82.1	30.24	83.0	80.8	30.24	83.0	80.8	0.16	...	...	30.24	83.0	80.8	30.24	83.0	80.8	30.24	83.0	80.8	30.24	83.0	80.8	30.24	83.0	80.8	30.24	83.0	80.8
25	30.27	83.5	82.1	30.27	83.0	80.8	30.27	83.0	80.8	0.16	...	...	30.27	83.0	80.8	30.27	83.0	80.8	30.27	83.0	80.8	30.27	83.0	80.8	30.27	83.0	80.8	30.27	83.0	80.8
26	30.30	83.5	82.1	30.30	83.0	80.8	30.30	83.0	80.8	0.16	...	...	30.30	83.0	80.8	30.30	83.0	80.8	30.30	83.0	80.8	30.30	83.0	80.8	30.30	83.0	80.8	30.30	83.0	80.8
27	30.33	83.5	82.1	30.33	83.0	80.8	30.33	83.0	80.8	0.16	...	...	30.33	83.0	80.8	30.33	83.0	80.8	30.33	83.0	80.8	30.33	83.0	80.8	30.33	83.0	80.8	30.33	83.0	80.8
28	30.36	83.5	82.1	30.36	83.0	80.8	30.36	83.0	80.8	0.16	...	...	30.36	83.0	80.8	30.36	83.0	80.8	30.36	83.0	80.8	30.36	83.0	80.8	30.36	83.0	80.8	30.36	83.0	80.8

1 B From a comparison of the two Barometres, the difference is that at the Company's Office is higher than that in use at the Surveyor General's Office.

Correspondence and Selections.

REMARKS ON THE PROSPECTUS OF THE CHITTAGONG JOINT STOCK COFFEE COMPANY.

*Extract of a letter from EDWARD O'RILEY, Esq., dated Amherst, 21st
September. 1843.*

"I requested Mr. Wray to inform you, that I would furnish a memorandum of necessary outlay for commencing a coffee cultivation, the one published in the Journal, from Mr. Sconce of Chittagong, appearing to me to be deficient in correct data. To this subject I intended to have paid particular attention, but isolated as my position is here, it frequently happens, as in the present instance, that I am only apprized of the departure of vessels at the eleventh hour, when I am obliged to make the most of the time before me. So much in excuse for the rough memorandum accompanying this."

MEMORANDUM.

In perusing the statement, published in No. 3, of the Society's Journal, on the subject of a Coffee cultivation at Chittagong, communicated by Mr. Sconce, it appeared to me, that there was an absence of correct data, in regard to the necessary outlay for such an undertaking, and although the result as exhibited by Mr. Sconce, after several seasons, will not be materially affected by the present exposition, still, it is due to all operations of the kind, that every available data should be afforded, to prevent disappointment in the commencement; when from unforeseen outlay, and a too sanguine expectation, the parties interested are sometimes induced to relinquish its prosecution to maturity, which with a proper degree of experience to bestow thereon in the outset, would secure success under ordinary circumstances, and create a confidence therein, without which all such undertakings are abortive.

Taking Mr. Sconce's calculation for the area required for planting 11,520 plants, or six droons of land, each to contain 1,920 plants, (which as affording sufficient room for each plant is most correct,) I consider that the original expense for clearing jungle lands adapted to coffee, and preparing the six droons up to the time of planting, would require,—

10 Coolies, 4 months, 4 Rupees per month,	..	160
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1 Superintendent, ditto, 20 Rupees ditto,	..	80
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Total,	..	240
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Preparing nursery, and securing 12,000 good plants, including pay of 1 Mallee for 12 months, to be fit for transplanting,	..	80
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6 Coolies for 2 years, from time of transplanting, 4 Rupees per month,	..	Rs. 576
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1 Superintendent ditto, 20 ditto,	..	480	1,056
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Outlay for cultivation for 3 years,	..	Co's. Rs. 1,376
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Expense for <i>Godown, drying platforms</i> (which should be puckah built and plastered so as to form an inclined plane.) <i>Sheds</i> for drying in-doors during rainy weather, <i>mill for pulping and one for husking</i> the berry with <i>winnowing machine</i> for cleaning, to cover all,	..	2,500
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Houses for Superintendents and Coolies,	..	250
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———— 2 pairs of Bullocks,	..	60
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———— 2 Carts,	..	40
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———— Kodalies and other instruments,	80	180
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Contingencies,	..	400
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Total Outlay at the end of three years,..	Co's. Rs. 4,706
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Carried over,	..	4,706
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N.B.—The above statement shews the outlay required for a *permanent establishment*, which by adding the necessary labour, will afford data for an extension to the amount of a lac of plants.

Brought forward, 4,706

At this age of the plant the produce would fall considerably short of the rate stated by Mr. Scone, $\frac{1}{2}$ lb. per tree, but presuming that to be the average amount produced, the loss from jungle cats, monkeys, and birds of all kinds, would be severe on so small a number of trees; and the average would thus be reduced to say $\frac{1}{3}$ lb. per tree, = 3,840 lbs. or maunds 47, at 14 rupees per maund, 658

Co.'s Rs. 4,048

Produce of fourth year's crop $1\frac{1}{2}$ lbs. per tree (which if the plants were properly tended in the nursery and transplanted without injury to the tap root, would be the minimum average,) and to allow for loss by wild animals, say $1\frac{1}{3}$ lb. per tree,

Nett produce 190 maunds at 14 rupees, *2,160

2,630

Less, Wages of 4 Coolies, { Rs. per month, }
 at 4, 1 Superintendent, { 12 months, and } 500 *2,160 1,888
 at 20, { other expenses, }

5th year's crop would produce 2 lbs. per tree,
 averaging 300 maunds, @ 14 rupees, 4,200

Less expenses for the year as above, 500 3,700

Profit after clearing all expenses, 1,812

N. B.—The 6th year's crop might be expected to average nearly $2\frac{3}{4}$ lbs per tree, and upon a plantation containing a lac of trees, this would be considerably below the nett produce, every thing being in favour of *quantity* in a cultivation of the kind.

Instead of transmitting the produce home, and suffering all the inconvenience attendant thereon, the better plan to adopt would be, to arrange with some mercantile house in Calcutta take to over at once at the current value of the market, which, in the foregoing statement, I have placed at 14 rupees; this plan would obviate many inconveniences, and by realizing the produce on the spot, afford available funds for reinvestment at once in extending the cultivation, which would of course form the chief object of the parties interested.

It is in fact with this view, that I have estimated the expense for the necessary appliances of mills, sheds, godown, &c.; and in allowing for salary to Superintendents, it may be necessary to remark, that such a person should be capable of forming a judgment as to the degree of shade required when preparing the lands; to set out such trees as answer for that purpose without encroaching too much upon the space left for the plants, and for the exercise of other duties which the natives generally are incompetent to perform.

Mr. Sconce refers to the probability of expense for purchase of *paddy lands* to apply to this cultivation; such lands, however rich, should be avoided, if the lands *annually flooded* be those in question: all argillaceous soils are hurtful to the plant, except those that are at a considerable altitude of a *felspathic* character, and possessing a moist atmosphere, with plenty of shade to retain the moisture: the more open and pervious the soil, the better; but as I have elsewhere remarked upon the nature of the sites, with soils most adapted to coffee cultivation, to those remarks I must beg reference for all further information on the subject.*

Amherst, 21st September, 1843.

CULTIVATION OF THE TEA PLANT AT CHITTAGONG.

Communicated in the following letter from A. SCONCE, Esq., dated August 12, 1843.

MY DEAR SIR,—I doubt very much if my imperfect attempt to make Tea from leaves grown at Chittagong, be worth your notice. However, I send you some in the accompanying bottle. It is made from Assam Plants, of which nearly three years ago, I got a boat load, through the kindness of Major Jenkins. The soil on which they are planted is very sandy, and of necessity poor. Still the bushes, many of them, have shot up to a considerable height, 6, 8 and 10 feet.

By the time the bottle reaches you, I hope neither the look of Tea, nor the smell of Tea will have entirely disappeared. You will expect that a good deal has yet to be overcome in the way of flavour. The manufacture was performed over a kitchen fire in earthen dishes. By Mr. Bruce's account, the pans should be iron.

* These remarks are published in the Sixth Volume of the Transactions of the Society.—ED.

I am this year gathering a considerable quantity of seed, and what I prize very much, *three* China Tea plants, which I got from Dr. Wallich, are also giving seed. It seems to me that the enquiry as to the difference between the Assam and China plant, (practical difference as regards Tea drinkers, if not essential difference as regards Botanists,) has not been prosecuted as it ought. To look at, the leaves of the plants are very different, and even the seeds of my three China plants which are growing close together, differ, the seeds of one bush from the seeds of another, most perceptibly in form, size, and general appearance.

I am, &c.

(Signed) A. SCONCE.

Report on sample of Chittagong Tea By CHARLES TERRY, Esq.

I have examined the sample of Tea you sent me, the produce of Chittagong, and have much pleasure in handing you my opinion of it.

It is a superior Tea in flavor, also in strength, and is of the Pekoe class. Had it been well manufactured, it would command a good price in the English market.

The manufacturing does not appear to be understood, the leaves not having been rolled.

I should recommend any parties interested in the cultivation at Chittagong, procuring a particular account of the process adopted by the Assam Company, which is very simple, and would not fail to render the article valuable.

Calcutta, 16th October, 1843.

CULTURE OF EGYPTIAN WHEAT AT BOLUND SHAHUR.

Extract of a letter from THOMAS TONNOCHY, Esq. dated 11th August, 1843.

“Many thanks for the ears of Europe wheat and barley you sent, which shall be carefully sown, and the result made known to you. I herewith forward to you four ears of wheat, the seed of which I got from a friend, who said it was from Egypt. I was induced to send this specimen from observing it, on comparison, to be much

larger and heavier than those received from you, of which the Hopetown looked the best.

The accompanying wheat was sown on a few square feet of ground, and nothing could be better than the splendour of its appearance when full grown. It was full six feet high, with a very long beard, (which in the specimen I have cut off to lighten the weight, *i. e.* of three, for one was beardless); but what distinguished it from the common wheat, and made it look so imposing, was the bluish tinge of its stalk and leaves. The past wheat season up here was a very bad one indeed, otherwise I think this specimen would have shewn much better; it fell off towards the end very suddenly, just in the same manner as the country wheat, in which a loss of full one-quarter was experienced in the produce. This was owing to the long and unusual continuance of a dry westerly wind. I have not as yet examined the grain of wheat I send, but will compare it with yours at sowing time. I have prepared a large well-manured field for my wheat, and should this be found to answer, I will I assure you, extend its cultivation in a very material degree along with the sorts you have sent, should they also turn out well."

Report on the above sample of Wheat. By W. HAWORTH, Esq.

I have examined the ears of wheat you sent me, and which I understand are grown from Egyptian wheat. The ears I should consider very fine and well grown, the quality of the grain is very superior for this country growth, in nature and appearance it resembles the "Gungajilly" wheat grown in the districts of Rajmahul to Patna, and it is also like some of the wheats imported into England from the Mediterranean, or perhaps more like the wheat brought from Odessa; it is hard and flinty, quite unfit for the English market, except to mix with wheat of soft and unsound condition; alone it would make a dark colored flour of little value, but on the contrary, if ground into the article so well known amongst the natives, called *Soojee*, it would make as fine bread as could be wished for.

Cossipore, 25th September, 1843.

On Manures. By Mr. TOWERS.

The period we live in is marked with novelties. For years, for generations, our farmers indulged in no changes: they anticipated none; but now, everything is or ought to be new. Yet, in sober truth, there is nothing really new under the sun. The laws of nature change not, her principles are ever the same; the novelty consists in their adaptation.

Thirty or forty new manures are now before the public in the columns of the agricultural journals; yet what *are* they, how were they discovered, and to what purposes of utility can they be applied? To the last question we reply first, and for this reason. The extension and diffusion of science is the all in all—the *sine qua non* of agricultural prosperity—and, therefore, we say that the only good which we can discern in the multiplicity of new stimulants, consists in the proof thereby afforded that science is at work. inquiry abroad, and, as a necessary consequence, that great improvements are on the eve of discovery, whereby, spite of depreciation in price, and competition on the part of foreign states, agricultural productiveness will be so much increased, as to obviate every cause of alarm, and to ensure a just and adequate return.

But, in order to approach to an understanding of the agency of manures, we must attain some knowledge of first principles. It has been already stated that the laws of nature change not—man, in all his operations, if successful, has, though unwittingly, been guided by those laws, but herein he acted by mere routine.

The *science* of agriculture implies an investigation of the components of vegetable bodies, and of the constituents of the soil in which they grow. Herein it is that chemistry may be appealed to with the greatest prospect of success, provided that the operator be alive to the paramount influence of the vital principle.

Chemistry can only act upon dead or inert matter: if it approach the principle or agency of life, it at once assumes a false position. Fortunately, however, for the science, in dealing with the products of organization, it can, by means of reagents, determine, almost to atomic precision, the constituents of any matter which it may detect. Thus, for example, a portion of dry and inert potato-haulm is weighed, and its weight accurately registered; it is then burnt with

that degree of watchful precision which is perfectly compatible with the refined apparatus of the philosophical laboratory. Its products of every kind are collected, weighed, or measured, and tested. They are found, with few exceptions, to be oxygen, hydrogen, carbonic acid, and sometimes nitrogen gases. These are the volatile or organic products. In the ashes, which remain fixed, are found certain earths and salts, which are now called the inorganic products. Were the living and growing plants investigated, not one of these constituents could be traced; in fact, their existence could only be inferred by reference to the products obtained from analysis of dead vegetables.

But, as nothing can come of nothing, if pearl ash, (*carbonate of potassa*,) soda, chalk, (*carbonate of lime*,) iron, &c., be detected by acid reagents in the ashes of plants, it is manifest that they must have existed in some form or other within the organs of the plant during vegetative life.

It is ascertained that the atmosphere from which plants may inhale some of their constituents contains oxygen and nitrogen, in the proportions of one of the former to four of the latter, and also some floating carbonic acid and watery vapours; but none of these could produce the alkalies, metals, and earths above named. Therefore it is reasonable to infer that the earth is the source of all the said inorganic substances, of which the water, existing in the earth and produced by rain, has been the solvent.

But since the juices of the living plant do not exhibit, in general, any traces of those alkalies, earths, or metals, in a state similar to that in which they are found in the ashes, we obtain a degree of evidence that they are combined with some vegetable organic acid in the condition of *salt*, either neutral or super-acid, and such, in fact, can, in certain instances, (as in sorrel, rhubarb, the grape, &c.,) be demonstrably proved to be the fact.

The above are general principles, on which we are able to found particular facts. Thus, then, in conformity with these principles, modern physiologists consider as organic products all the combinations of oxygen, hydrogen, carbon, and nitrogen, elaborated and deposited in the vascular and cellular systems of plants by the agency of the vital principle; while, on the contrary, those matters derived

from the earth, which are metallic, earthy, or saline they denominate *inorganic*.

The phenomena of growth and cultivation, therefore, depend upon the relative mutual agency exerted between the vitality of plants and the earthy medium in which their roots extend and obtain fluids that can be organized or converted into specific products.

If these views be philosophically correct, the entire theory of manures assumes a certain position; we may not indeed be able to trace the minutiae, or detect the mysterious agency of causes; but the principles are simple and unerring.

Causes and effects are herein assured; but, at the same time, we are instructed that, unless by rigid investigation we discover the specific components of each plant, the method by which it is cultivated will remain a matter of unscientific routine. Education, philosophical principles, and a practice induced by discovered facts, are thus indicated, and, therefore, imperatively called for.

In the meantime, as we are instructed by general principles that all the organic products of plants contain only the elements of water and of atmospheric air, and as analysis has demonstrated that the manure of a farm-yard, derived from decomposing vegetable and animal refuse, comprises all the essential ingredients of those products, we perceive that the manures which we already have at command—provided they can be obtained in sufficient quantity—are available, to all intents and purposes, without having recourse to expensive foreign supplies.

Liebig, and several other most eminent chemists, have shewn that loams, which are the products of a variety of rocks broken up by natural processes, contain potass, soda, or both. These alkalies are very soluble in water, and, therefore, may be absorbed by plants, till, at length, a soil shall become exhausted.

Herein we perceive the necessity either of a renewal of the staple loam or the application of some salt, the basis of which is soda or potassa; hence the utility of the nitrate of soda and common salt.

Farm-yard manure, and especially if it be replete with urine, develops abundance of ammonia which passes into the atmosphere. During its progressive decomposition, (commonly termed putrefaction,) a volume of carbonic acid is formed and escapes. These two

products demonstrate, 1st, The presence of hydrogen and nitrogen, which constitute *ammonia*; and, 2d, Of carbon and oxygen, which form *carbonic acid*—abundance of watery vapour escapes at the same time; and, finally, the dung-hill is reduced to a black mass, which consists chiefly of carbonaceous matter, and becomes a good representative of the substance termed of late *humus*.

Here we perceive all the elements of vegetable matter. The most delicate research fails to detect in wood, fibre, vegetable tissue, gum, rosin, sugar, flour, starch, or other products of organic action, any elementary constituent, except those earthy and metallic substances which are traceable to the earth as their origin.

Earths proper, consist of clay, chalk, sand, and iron, combined with a varying percentage of the alkalies, soda and potassa. Clay or alumina, sand or silex, and oxide of iron, are soluble in water in a very slight degree. Chalk or carbonate of lime is more soluble; and the alkalies perfectly so. Whatever portion, therefore, of any of these inorganic substances is found in vegetable structure, whether simple or in a state of combination, must have been taken up by the roots with the raw sap.

Earths, therefore, undergo little change, but manures vanish. A firm and rich loam is retentive of manure, upon the principle that it encloses and guards it from the decomposing influence of atmospheric air and moisture. Loose sands permit the manure—that major part of it which can be converted to gases—to pass off as such into the atmosphere. Now the decomposition of manure, which must and will take place, rapidly or slowly, in land of any kind, is hastened prodigiously by the action of growing crops, and herein, as is familiarly known, consists the exhaustion of a soil.

The decomposition of manure mainly depends upon the presence of moisture, and, during the process, a certain degree of heat is created. *Water*, therefore, is decomposed in the first instance, and experiment has proved that, during that phenomenon, a stream of electricity passes, to an extent so vast as to strike one with awe. It is fair, then, to infer that electricity, revealed by the decomposition of water, disturbs all the elements of the manures, and induces them to recombine in the form of ammonia, carbonic acid, and humus.

We have found, in recent publications, frequent allusion to the waste of ammonia during fermentation, and to the propriety of fixing that alkali by sulphuric acid, &c., particularly in tanks containing liquid urinous manure. But while we perfectly coincide with the chemical theory of the fixation of volatile ammonia by an acid, which converts it to a sulphate or muriate, we are by no means anxious on the subject. If the ammonia passes into the atmosphere, we know that its affinity for water and vapour is so strong that it will be thereby retained secure, till it return to the earth in those genial showers (rendered *soft*, perhaps, by the ammonia) which contain all that is required by plants, and in a form far better than we can confer by any of our rude attempts at imitation.

Having endeavoured to shew, by a comparison of the constituent elements of plants, and those of manure and the earths, what are the substances required in general culture, we hope that it will appear evident that our agriculturists ought, as an imperative duty, to economize those refuse substances which are, to a great extent, lost in this very populous country.

In re-urging this subject, we are aware that we do but follow in the path of many able writers who have strenuously remonstrated against the waste of those most powerful manures which we do worse than throw away.

Were the night soil of every farm-house received into a bed of good loam, and covered by a stratum of the like earth occasionally, (a very simple mode of erection might be readily adopted to effect the object,) the mass would be made to retain all the fluid as well as solid substances it abounds with. It might, then, from time to time, be transferred to brick or clayed tanks, conveniently situated, wherein it could be protected by a stratum of the loam for some months, till fitted for the fields. Very little waste would then be produced by decomposition.

Liebig says, that the Chinese use no other manure, and hence their fields are comparatively free from weeds. "Indeed, so much value is attached to the influence of human ordure by these people, that the laws of the state forbid that any of them should be thrown away; and reservoirs are made in every house, in which they are collected with the greatest care."

In London, our fine river receives from the sewers volumes of substances which tend to degrade and poison its stream, but which, if properly applied to the land, would double its productive energy.

Night soil contains all the elements of every plant, and in a state of combination which proclaims it to be superior. Why do we neglect it? Why, on the contrary, do we divert it to the worst of purposes? Were it duly collected, condensed, and applied, our farms would require no foreign appliances, no expensive importations, or spurious attempts at imitation.

Of the theory of manure we say little. Experiments, scientifically conducted, and unintermittingly pursued, are wanting to enable the agriculturist to be sure of any doctrine; yet enough is known to assure us, that dead and decaying substances are the appropriate aliment of organic structure, and, therefore, the decomposition of manure is essential to prolificacy. In agriculture we have found no principles, all has been conducted upon routine; hence there is not only great room for improvement, but assurance that with it the productiveness of the land must increase.

We are in no real want of guano, the urates, or other substances bearing attractive titles. So long as compounds of decaying animal and vegetable matter, comprising oxygen, hydrogen, carbon, and nitrogen, can be abundantly obtained from the reservoirs of night soil, and the cleansings of offices and farm-yards, so long may we stand aloof from other appliances.

Let us husband all our resources, conduct our drainage, tillage, and rotations upon scientific principles, and nature will do the rest; and, in the meantime, discovery will proceed, and causes be rendered intelligible.—*Journal of Agriculture, and Transactions of the Highland and Agricultural Society of Scotland, for July 1843.*

Culture of the Potatoe. Mismanagement it is subject to. Cause of Curl and Dry Rot. By JAMES BARNES, Gardener to the Right Honourable Lady Rolle.

I will now give you my opinion on the culture and growth of that invaluable vegetable the potato; the abuse and mismanagement it is subject to; the cause of curl, and of that enemy the dry rot, &c. &c. It may be thought by some that I know more about eating a potato than about the proper method of growing them; and certainly the art of cooking them is a greater trouble than growing them, about which I mean to say no more than I have myself observed. I hope it may be useful to some. I shall give my honest opinion, and facts are stubborn things. I have had considerable practice in growing potatoes in pots, in cellars, in sheds, in pits, in frames, in hothouses, hooped and matted in the open ground, in borders in the open garden, and in the open field. I have practised in all these ways for several years; but I do not pretend to say that my methods are superior to any other person's; one thing I can say, that no person has ever beat me yet at any exhibition of early frame potatoes; but I do not wish to boast.

Now the greatest fault I have always observed is in preparing the seed; how can you expect to have a good crop of potatoes if the seed is bad and has lost its virtue? For instance, I have often seen, at this time of the year, potatoes hurried out of the ground, chucked together in large heaps, or clamps as they are called in some places, wet and dirty as it may be. I have many times seen those heaps allowed to heat, and the steam passing from them as if from a dunghill; of course that must be wrong. I have thought, for many years, that the steam, or reek, which passes off must be so much virtue lost. I have seen these very heaps kept for seed, and allowed, in the spring of the year, to grow all together in one mass of shoots and roots, and to become so hot in the middle of the heap that you could scarcely bear your hand in it: the hotter they get, the faster they grow; and the faster they grow, the hotter they get: then perchance they get moved, and the shoots are pulled off to give a check, to keep them from growing. Can such potatoes as these be either fit to eat, or in a proper state to plant? My opinion has

always been that the principal virtue is thus lost. But, notwithstanding, they are planted again, and if cut, which is the usual practice, they perhaps lie about for several days after, sometimes for weeks ; and then are put into the ground after making what is considered a good preparation for it. If it comes on very wet weather, a great many of them slop away, as it is called in Devonshire, and the remainder become weak, and look spindly and thin all the summer. If it should be a hot and dry time when planted, and the weather continues dry for some time after planting, of course they get dry rot, which is plain for any body to see. I have seen this hundreds of times in different places, and have often pointed it out ; but nobody would ever admit it was their own fault : it was either the fault of the ground, or of the season ; *they* had done everything they could. According to my observations, my opinion is, that the *curl* is principally occasioned by using imperfect seed that has not been sufficiently ripened ; such, for instance, as late-planted potatoes : many select them because they are not fit to eat, and, therefore, think they will do to plant. An early frost having come, and cut them all down before they have got half their natural growth, it makes them so watery and waxy that they are not eatable, and, therefore, they bundle them close together somewhere to give them a sweat ; and think they will then do for seed.

In planting potatoes, I have for many years observed that three parts out of four are planted too late, which is a very great disadvantage in more ways than one. First, the seed gets exhausted ; 2dly, a considerable portion of the most valuable part of the season is lost ; 3dly, if it should set in a dry summer a great portion of the seed is lost, and what does spring up is only weak. If it should set in a wet summer they slop, and what remains does not ripen. My system is to plant all seed whole ; neither large nor small potatoes, but a middling size, from the size of a pigeon's egg to that of a bantam's. When they are first dug up they ought to be sorted for that purpose ; and they should be exposed to the sun and air to harden ; and, when put away, laid in lofts or on shelves, or in places where they will neither grow nor get heated.

The greater part of the potatoes I have seen planted in Devonshire has been done too late by six or eight weeks ; and, if it were not for

its beautiful climate and soil, what could they expect to get, as the preparation they make is but poor. In the first place, generally speaking, they plough the ground only to the depth of 4 or 5 inches; I think that is not doing much towards it: 2dly, the earth between the rows does not get half-hoed, nor stirred about enough, after the potatoes are up. My own opinion is full, made up, that the ground should be broken up deep, stirred and worked about in every possible way (particularly in dry weather), for every thing that is planted; the best manure is that supplied by the atmosphere, without which nothing can thrive. I do not mean where the subsoil is barren and unfit to turn up on the top of the other; but, at all events, break it: even if you let it lie where it is, the atmosphere can penetrate and the water can pass through freely; but neither can do so, except you keep the earth open. For instance, if you go to any wood or hedge-row, and grub up trees that have sprung up naturally, without the assistance of man, you will there find the nature of the earth is porous; partly from roots decaying, and partly by moles, mice, worms, and insects working through in all directions, which, of course, allows both air and water to pass through in its natural way. Why should we, under pretence of cultivating and assisting nature, puddle and trample the earth for four or five inches on the surface, to stop up all the pores? It seems strange, but I am sorry to say I have seen it so, and so it is likely to continue. I have never had the pleasure of seeing but one subsoil plough since I have been in Devonshire; and what gave me pleasure, did not do so to others. I laugh to think of the many curious remarks I heard made on that "ugly plough," as it was called; they were certain it never would answer hereabouts.

Whilst I think of it, I must tell you how they get up their potatoes in Devonshire, which, I think, will make you laugh too. They do not take them up with a fork of any kind, but have what they call a "tibble;" that is, two bills, what you would, perhaps, call a mattock. I have always heard it so called everywhere but in Devonshire. What we call a fork, too, they call a *pick*. Well, they go into the garden with this tibble and a maun (they call a basket of any size a maun); they thrust this tool amongst the potatoes with all their might, the same as we used to do at Norwood

amongst the oak stubs in clearing the woods. As soon as two or three potatoes are rooted out, they let go their tool and pick them up; then taking hold of the tool again, as before, they root out two or three more. This is their manual of grubbing up potatoes: in wet, bad weather you may guess they lose nothing by the job; for they and their tibble are besmeared all over with slub. I think there should be some fine enforced for robbing the fields of so much good earth. I have often asked them why they did not get proper potato forks, and have told them that they would take up a larger quantity, and in better condition; and that they ought to have some to fork out, others to pick up, and bag: but they alway replied that it would never answer in this part of the country, and that a man could get up a larger quantity with the tibble; though they acknowledged they had never tried my way, or used any kind of fork, but had seen them ploughed out.

I omitted to observe in the proper place that when potatoes are allowed to grow in a shady situation, under hedges or trees, they do not come to proper perfection, and are mixed with the others which were grown in the open field, which accounts for some being found waxy or watery amongst the others when cooked; likewise in the next season, when planted again, for finding a few in one row and a few in another curled.

As I have before observed, all potatoes that are meant for seed should be ripe, and hardened by the sun and air before stowing away; that they should be kept in an airy dry situation, and never allowed to grow until they are planted out, under any consideration; that a thoroughly good winter fallow should be made, and the ground well broken up at this season of the year, and laid as rough as it can possibly be made, for the sun, wind, and frost to penetrate through it. Any good stable-dung, cow-dung, dung from the pigsties, or any other good manure, will grow potatoes well, if the ground is only properly prepared, and thoroughly sweetened with the atmosphere; taking care to plant them in good time for general crops. I like to have them all in between the middle of March and the last week in April.

For the growing of potatoes *in pots in hothouses, &c.*, to have them good in January, they should be planted the first week in

October in a 60-sized pot, placed at the back end, or in any part of the hothouse where you can put them thick together; as fast as they get up and are three inches high, take them out into a colder place, such as a vinery or a peach-house. When you have a quantity in readiness, fill as many good-sized pots as you can spare; get some good, open, rich, sweet mould; fill the pots three parts full, not sifted but rough; place them where you intend them to stand in rows. A peach-house is the best place; in one where you intend beginning early, you get the first crop off before the leaves of the peach trees shade the house at all. In planting them into the larger pots from the sixties, pull off all the shoots except the one that is the strongest; never allowing more than one shoot to each plant at this season of the year: put three or four plants into a large pot, according to the size. Be careful never to water with cold water, or they will come on very slowly; also be sure you do not over-water them, or the flavour of the potato will be lost; a little manure liquid, with some soot in it, once, is a fine thing. When fit to earth up, fill up the pots; and when they have made their growth leave off watering them altogether, if you wish to have a good-flavoured and dry potato. If you have not small sixties to spare, use pans, shallow boxes, or an old basket, or lay them inside of a hotbed, either in a frame or in a hothouse, which will hatch them quite as well.

For growing them *in pits or frames*, I make a very slight hotbed with a few leaves and rubbish (for bottom-heat does not suit a potato by any means). Get some good, prepared, sweet, open earth, and put it all over the bed 12 or 14 inches deep; have your seed all ready hatched as before recommended; turn them all out as near of a size as possible, taking care to pull off every shoot but the strongest one. With bestowing this care and attention I have had as fine crops this way as I ever saw out of door. I always grow the Albion, or Dwarf ash-leaved Kidney, for all early purposes; having proved it be the best sort for that. I have now at this time my third crop planted: the first is all up as strong as on May-day; the second coming on; the third just planted; and so I continue to plant again into the sixties as fast as I turn the others out.

I hatch the whole for all early work, likewise for hooping, and the first turned out on the border: they will stand in any corner out of

the way to hatch. In *hooping* or sheltering potatoes with mats or canvas, I make it a rule to throw out 4 feet in width across the garden where I take up my asparagus for forcing, throwing the earth out right and left to sweeten, to the depth of a foot; then the dung, and leaves which come away at that season of the year from the sea-kale, that has been in use all the winter, is put into this trench about 12 or 14 inches thick, and the earth thrown back over it. I next take the scarlet-runner sticks, and lay them on and across; tie them to the height of about 12 inches above the bed, and then turn the potatoes out as above recommended, all ready hatched either in pots, or any of the conveniences which at that season of the year are plentiful, such as pine-stoves, vineries, cucumber and melon beds, &c. It is astonishing what time you gain by having them always ready hatched: not only that, but it requires so little of any sort of fermenting materials; only wanting a very slight warmth, just to start them at first going off; for potatoes do not like bottom heat. By hatching a few to turn out into a sheltered situation in the borders or elsewhere, and by following the practice I have recommended, I find I have always a plentiful supply of good new potatoes all the season, until such time as they come naturally out of doors.

To prepare for the *out-of-door* potatoes, it is only necessary to do as I have before stated. Get the ground well-worked, sweetened, and manured, and planted in the proper season with whole seed that has neither been heated nor allowed to grow before planted. If what I have recommended is attended to, the curl, dry rot, or sloping, will never trouble you; but you will be satisfactorily repaid for all the labour and expense you have been at to bring them to perfection.

To grow them *in cellars or sheds* is nothing more than procuring a quantity of last year's old potatoes in August and September, and stacking them in rows on shelves, or on the ground with a quantity of old tan or light earth between them, when numbers of young potatoes of a bad quality form themselves. It is not much practised now by the London market-gardeners, but it was twenty years ago, when the London purchasers soon got tired of them.

To *cook a potato* well, the following is the best and most simple method I know of. An iron saucepan is the best for cooking them

in, as the copper ones, if not quite clean, are apt to be dangerous. They should be dressed with the skins on, and not be drowned with water; done quickly, and the water poured off directly they are about done, shaking a little salt amongst them, leaving them near the fire, with the cover of the saucepan loose, so as to admit of the steam passing off. This will ensure you a dry meal; potato.

Exchanging seed, one neighbourhood with another, is very essential; and a very beneficial improvement will be obtained thereby, both in crop and quality. All seed should be changed once in two years, not only potatoes but all sorts of corn and vegetables, the benefit of a general system of exchanging throughout the whole country would be very astonishing.

I have known, for some years, that it is the opinion of various persons that over-ripeness in the seed potatoes is the cause of their *curling*. Of this I have no doubt whatever, although in my own practice I have had no proof of it, having always made it a standing rule to take up all kinds of potatoes before getting over-ripe, that is, as soon as they are moderately ripe. I have had practical proof that, if the unripe and imperfect seed potatoes are planted, they cause the curl; therefore, it appears quite reasonable to me to hear of over-ripe seed potatoes getting the curl, as well as those which are unripe. The former curl because they have lost part of their properties and substance; the latter curl through not possessing these properties and substance at all. The same is the case with all kinds of fruit, either under-ripe or over-ripe; of course, either way, it does not possess its full properties. Corn over-ripe, every one knows, more particularly wheat, loses a considerable quantity of its properties: with all kinds of seeds the effect is the same; of which I, myself, have in many instances had ample proof, which, at present, I will not enlarge on.

In a short time I think of giving you a rough sketch of my management of the kitchen-garden, cropping, trenching, hoeing, &c. &c.

Bicton Gardens, Nov. 7, 1842.

P. S.—*June 29, 1843.* Having met last week an old experienced farmer, I asked him how his potatoes were looking this season. He informed me that they were very indifferent; that he had been a

considerable distance about the country, and found those of many persons much worse than his own ; that many acres were ploughed up as a complete failure ; and that in many situations he had observed the missed places planting with fresh seed. My own opinion is, that planting and filling up with seed more exhausted than the first is of but little use ; for this reason, if any of them should grow they will be much later than the others, and spoil the sample, particularly if they should be for sale. I should recommend calculating on the crop ; then, at certain distance, taking up with a spade the plants of so many rows, and planting them in the vacancies, right and left, as they are taken up. The cleared ground could then be planted with other potatoes, or sown with turnips, to be pulled off early. No vegetable that I am acquainted with transplants better than the potato, if properly done ; it is the means of checking the over-luxuriance of the stalk, and increasing the size of the tubers.

I asked the abovementioned farmer what was the principal failure or disease so prevalent amongst the potato crops, and the cause of it. The latter he could not account for otherwise than that it was his opinion, and that of most others he had conversed with, that it was through the wet unkind season ; although, to their surprise, the dry rot was very prevalent, as well as sloping, or wet rot. Besides, he says, there is another failure very prevalent this season, that much of the seed produces underground tubers without shooting up, or producing any stems. " What could be the cause of that," says the farmer ; " if not the wet cold season ?"—" Exhaustion of the seed before planting," I answered, " is the cause of each disease you complain of."—" How can that be," asked the farmer, " when last autumn was one of the finest I ever remember for ripening the potato crop ; so that many persons' potatoes were ripened and taken up several weeks sooner than usual ? Besides, we had a very mild favourable winter ; no frosts to injure them in any way."—" The more likely to get exhausted," I replied, " by heating and growing."—" Very likely, very likely," replies the farmer, " I am sure ; though I never once gave that a thought, although we have suffered from dry rot and sloping for years, hereabouts. On second thoughts," he says, " that cannot be the cause of all three of these diseases : dry rot, sloping, and tubering under ground without sending up

stems."—"I am perfectly satisfied it is," I replied. The dry rot affects those most from the middle of the heap, that have been the hottest. Those have gone sleepy, dead, and *dr'ry* [? drowsy], like an over-ripe apple, looking fair to the eye although perished; and they are to be found amongst old potatoes, for several months in spring and early summer, on many people's tables, spotted, black, and flavourless, amongst others tolerably good. The sloping, or moist rot, is caused by the same; but, probably by their being nearer the outside of the heap, the steam and moisture cause them to grow freely, or, I should say, shoot in the heap freely. Thus potatoes that were good in autumn are found in spring to be waxy, watery, and black. Pulling the shoots off in spring, and exposing the seed to the atmosphere, which is very frequently done with the seed potato when it is considered safe from frost, and they are not required to eat, are the means of producing tubers without stems; and I will give you my reason for forming that opinion. When a boy I was set to clear out the bins in a potatoe cellar. I particularly noticed in one bin, near a window that had been standing open for a considerable time to allow the air to draw through to dry and sweeten the cellar, and where the morning sun shone in, that the few old potatoes there left had mostly formed plenty of tubers, and but few shoots. I well knew they had their shoots and roots pulled off two or three times in the previous winter and spring. Boy-like, I collected some of the largest of the young tubers, took them to some of the garden men just by, telling them there were larger young potatoes in the cellar than they had out of doors. On going to London afterwards to follow my business at market-gardening, I observed new potatoes were produced from potatoe cellars before we could grow them by forcing. It was a practice in some of the gardens to stack a quantity in old tan or light earth, in cellars or sheds, to cope with the others; but sometimes they grew all in one matted mass of roots and shoots. In my efforts to get over this difficulty, I remembered the potatoe bin; and by allowing them to grow a considerable length before making use of them, pulling off clean all roots and shoots, and exposing them to the sun and wind for a time, they answered expectation tolerably well, only that a large quantity was always lost with dry rot and wet rot, instead of producing tubers.

I am perfectly satisfied, from practice only, that were the seed properly sorted out in autumn, and prepared and taken care of through the season afterwards, as before recommended, we should hear of but few complaints about any disease amongst the potatoe crops: "prevention is the only profitable cure."

Hearing so much of disease in this valuable vegetable this season, and observing questions asked in the *Gardener's Chronicle*, and remarks made in that and other papers, I have been induced, in my humble way, to state the above, which I have entirely learned by practice. I also feared that I had not explained myself sufficiently, in the foregoing letter, on the subject of potatoe-growing.

System of Kitchen-Gardening. Culture of the Strawberry, Asparagus, Sea-kale, Celery, and Cauliflower.

In my last I promised I would give you a short account of my rough *System of Kitchen-Gardening*, which, I am sorry to say, is still in a very imperfect state; not one job having been done in Bicton Kitchen-gardens yet to please me. They, as you observed when here, are on a level (an artificial level though), well supplied with water all the year round, from a beautiful stream which runs through it. The ground a sandy loam; the subsoil a body of dry, coarse, red sand, inclining rather in some places to a sort of rocky flat stones. This garden was formed at an immense expense, having thousands of loads of loam to make the borders, &c., and yet in places the sand is still near to the surface: but since you were here I have got home about 500 yards of beautiful loam and marl; intending to make a good preparation for every tree that is planted, and to wheel a quantity of it on every piece of ground, as the crops are cleared off, giving the ground a good trenching, breaking the subsoil with a strong fork and leaving it where it is. I make it a standing rule to return as much as possible of the refuse of vegetables back to the ground again, by trenching down cabbage leaves, broccoli stumps, pea haulm, and all such articles, in a green state. The benefit to the soil is great, and the saving of labour considerable; for I have seen much time lost in clearing a piece of ground of the vegetable rubbish on its surface, previously to trenching.

Now the kitchen-gardening business, before I came here, had been done in a very different manner from what I had been in the habit of seeing done and practising myself. The tools the most paltry I ever met with. It is some trouble to get a Devonshire man to use a spade with an eye to it. Their spade (which no doubt you noticed when in this county) is an ugly, home-made, heart-shaped bit of heavy iron, with a great socket to it; and they form the handle of it themselves, by cutting a great, heavy, lumbering stick out of a hedge, 6 or 7 feet in length, about the size of a Kentish hop-pole, so that they can always use it without bending their backs; although the generality of men in Devonshire are a shortish race. However, this long-handled spade and the homespun tibble are almost the only tools you can get them to use; and they have the ugliest-made wheelbarrow too, the most awkward and cumbersome that can be imagined. Any kind of improved tool they appear to dislike; so that you need not wonder at our being a little out of order. For instance, a few days since, a load of potatoes was wanted from the field, for the use of the house. I had already had two potatoe forks from Essex. Some of my men saw them, and asked my foreman (who is a Scotchman, and had seen such forks before) what use they were of; and when he told them, and added he expected I was going to teach them how to take up potatoes, they laughed, and said that I should find I was mistaken, for such things would not answer hereabouts. I took a couple of my forks, and a boy to pick up, and I set to work myself, and told one of my men to take the other, and look at me, and follow on digging with it; and they all confessed they never saw such a quantity of potatoes turned out in so short a time before, but they still did not exactly relish taking them up in that way.

I found their system of working in the kitchen-garden was pudding it over; with scarcely depth enough, when digging, to cover an earwig. They had amongst them but one bit of a spade the length of my hand, and two long-handled spades, so worn that there was no fear of the men over-fatiguing themselves by lifting too great a weight; one two-pronged fork with a broken handle; one old drain-hoe; and two old Dutch hoes: and this was about the stock of tools I found in Bicton kitchen-gardens, and I thought them the most

miserable lot I had ever met with. However, I had fortunately brought a set of my goose-necked hoes with me; but I could not persuade any of them to use them, for weeding was the order of the day, and my hoes appeared to them the most ridiculous things imaginable. I wondered how the work was done with such tools, but soon found hoeing and raking to keep a smooth surface formed their method (for they had an old rake or two), and digging shallow and breaking fine, picking out all the stones (the very thing I thought the ground wanted more of). The strawberries were old, and all run together into a mat, which is the surest way to keep up a stock of different kinds of weeds for seed, so that they must remain in the garden; it likewise was a good harbour for slugs and snails to breed in, and for the birds to feed and hide themselves in. I soon found that when showery weather set in everything was devoured by slugs, which the men told me it was a wonderful garden for; and they accounted for it by saying it was a newly formed garden taken out of a field. I could not agree with them, so I set to work and destroyed an amazing quantity in a short time by the following method. Getting some fresh grains from the brewhouse, I went round, inside and out, dropping about a table-spoonful of them as I walked, at small distances in all directions, at dusk in the evening; I then went round with a pail of fresh-slaked lime from nine to ten o'clock the same evening, and found them heaped on each other like bees when swarmed: by dusting them with lime, I killed those that were so collected. I sent a woman or boy round with a pail and trowel the next morning to take them up, and bury them. It was astonishing what a quantity was destroyed by following this method closely for a month or six weeks; but it is the best plan to keep slugs away altogether, which is easily done by trenching, ridging rough, and continually hoeing and stirring the ground, which is congenial to all vegetation, but destructive not only to slugs, by turning them and their broods out, but to every other sort of vermin, which it lets have no peace, and either destroys them altogether or drives them away, as they do not like such usage.

No *strawberry plants* ought to be planted less than 2 feet apart each way, and never allowed to stand more than two years, taking care always to keep all runners cut closely off; by these means there is a

greater weight to be obtained, finer fruit, and better flavoured, as the sun and air can circulate more freely amongst them, and mulching them with clean short grass, just as they come into bloom, keeping them clean and the ground moist, make them flourish. If they are obliged to be watered, it must never be done with a rose on the watering-pot, but by pouring round the roots from the spout, so that they get a good soaking without wetting the fruit; for it spoils the flavour of the fruit if it is over-watered. The best-tasted and most prolific strawberries that I know of are Myatt's British queen, Myatt's Eliza, Myatt's prince of Downton, Keen's seedling, and the old true Scarlet pine. I find that the plants that have been forced, by being turned out as soon as done with into a good bit of ground well prepared, always make fine stools for the next season, or bring a good crop the same autumn, which is found to be very useful. Any good holding loam will grow strawberries, and bring them to a good flavour, if well prepared and sweetened by the atmosphere first, and some good rotten dung worked in amongst it, and a little soot sprinkled in amongst them and hoed in the month of April, will make an astonishing difference in the quality and flavour of the fruit; and, if the ground has become steely* and unkind by heavy rains, sow some charcoal dust amongst them, and hoe it in, which will soon purify the earth, and improve the crop wonderfully.

Asparagus, to be grown well, should have the ground well prepared, broken up to a considerable depth, and well manured, with some sea-weed or salt worked into the ground; which should be trenched in autumn or early winter, and laid in rough ridges so that the air, sun, and frost can penetrate through it. Forking the ground at every opportunity with a strong fork or pick-axe on every frosty morning, routing and turning it about when frozen, will not only sweeten and mellow it, but will kill all slugs and other insects. Never put in your asparagus plants until April; when the young plants are grown or shot 2 or 3 inches they always do best; if planted before they begin to grow, and the weather should turn out cold and harsh, oftentimes there will be many plants that will lie

* Steely. Clayey soil that has been poached when wet, and when the water cannot get away, is, when dry, difficult to penetrate with the spade or hoe, and in that state is said to cut out steely, or leathery. When wet it is shining, close, and tough, like liver: and when dry, hard, steely, and unkind, like iron.

dormant and not break at all, which causes so many blanks in the beds. If you intend sowing the seeds, do so a month earlier in drills 2 feet apart; which should also be the distance at which to plant them; thinning out the plants sown from 12 inches to 18 inches apart in the drills; never putting more than two rows of plants in each bed of 4 feet; and leaving from $2\frac{1}{2}$ feet to 3 feet alley, which is essential, and is a good shaded situation in hot dry summer weather to grow the late cauliflower and Cape broccoli. The system of covering the beds with earth to such a depth as is done by the London market-gardeners early in the spring I do not approve of, always considering it completely in opposition to nature. They say they cannot get a sale for it amongst the London people if it is not a considerable length: but of what use is it? The London people cannot eat those long, tough, hard stalks; for after all only the very top can be eaten. I always find that noblemen and gentlemen's families are most fond of asparagus in its natural beautiful green colour, and just long enough for the cook to tie into a bunch; then you do not rob and smother the plants, but have asparagus fit to eat, tender, and high-flavoured. It is one of the most wholesome and delicious vegetables grown, but wonderfully abused.

Sea-kale should have the ground prepared in a similar manner to asparagus, with salt and sea-weed, which it is very fond of, planting one-year-old small plants that have been saved on poor ground, the rows 2 feet apart, and 2 feet from plant to plant in the rows, not two or three together as is generally done; for if the preparation is good, one plant is always sufficient. It is as beautiful and delicious a vegetable as any that is grown, for winter purposes, if grown and blanched as it ought to be; but it requires time and attention to bring it properly to perfection. If it is hurried with too much heat, it is spindly, weak, and without flavour; if too slow, it is as bitter and worthless. In my opinion it is in its full perfection when from 4 inches to 6 inches long. When cutting it, take care always to cut the crown just under the earth: this should be particularly attended to. If the crown of the plant is left above the ground to be exposed to the frost after it has been forced, it causes the canker so generally complained of amongst sea-kale; but take care always to leave a little litter or leaves amongst it, so that the frost may not pe-

netrate to the crown, and then you will have healthy and wholesome sea-kale. But it is plain enough that, if it is otherwise, it is our own fault, the same as it is with the seed potato.

Celery is one of the most wholesome and useful of all vegetables, but subject to mismanagement to a great degree. In the first place, it is generally sown too early. The main crops should never by any means be sown sooner than the first or second week in April, and then on a very slight hotbed, covering a part of the bed with a light or hand-glasses, by which means you get plants of two different ages; taking care to sprinkle your beds and plants, when up, with water a little warmed. Keep the earth stirred often with a pointed stick to keep it open. As soon as the plants have two leaves besides the seed leaves, prick a quantity very carefully on another slight hotbed. If you want to grow celery extra large, then prick it again in about 16 or 18 days; then the third time, leaving the same interval between. Keeping them watered with good water, and hoeing them often, will be the means of having strong well-rooted plants; but they must not be allowed to stand, after the third time transplanting, more than 10 days or a fortnight, or the fibres will have spread such a distance that they will be subject to get broken off when taken up; which should be done with great care, with a trowel, with all the earth which will adhere to the plants. I must here make one important remark, which is, in planting in any stage of its growth never plant deep; always leave the collar and seed leaves above ground, and, as you must have plenty of room to plant it as high as you please, do not thrust your celery plants down into the cold gravelly or sandy subsoil beneath, for if you do it will never be good. You cannot possibly have good celery if you sow it too early, and then allow your plants to stand in the seed bed until it is drawn up weakly and spindly. I have seen some transplant it, and allow the plants to get again drawn up weak and naked-rooted, and then set to work in good earnest, because they saw a neighbour do so the day before, in planting his celery. So they dig out a trench a foot wide, and about the same in depth; put in some dung; turn up the subsoil amongst it, or on the top of it, that possibly had never been moved before; and then thrust into this trench their long weakly plants a good depth, as it is called, to keep them up; they

next earth them up early to smother them more, and expect to have good celery from this management, and when they find it fail, put it upon the soil or the season. My system is simply this. I always trench every bit of spare ground, and throw it in ridges as soon as any crop is off. Now many people will say: "We have not got time to do that; we have not strength enough; besides we are forced to keep the ground cropped to that degree that there is no chance of trenching;" but I contrive to find time in some way to trench all spare ground; by which means I always have a bit ready for successional crops, which is planned in my mind from time to time. I take my line and spade to one of those pieces of ground, measure it out, at least 6 feet from row to row, stretching the line from end to end across the ridges, and merely shovel out a shape of a celery trench 2 feet wide; if the ground has not previously been well manured, I of course shovel out the trench something deeper, to admit of manure, which should be good, strong, tolerably rotten dung of any kind. I then take the plants up carefully with a trowel, with good balls of earth; and plant them, if required extra large, from 12 inches to 15 inches from plant to plant, if of the usual size from 10 inches to 12 inches; taking care never to plant deep into the sub-soil, or to put the plant below the collar, for I would sooner see half of the roots exposed, than the eighth part of an inch of the heart buried. In earthing up, never by any means begin too early, for by that plan much of the celery gets considerably injured: and, instead of muddling it about with earth ten or twelve times, once or twice, or at most three times, earthing is quite sufficient to bring it to proper perfection. Every body knows that celery is fond of plenty of water, likewise of manured liquid; but in hot weather never water it overhead with a rose on your watering-pot; but pour abundance about the roots out of the spout, with a brushy stick put into the spout of the watering-pot, so as to cause the water to come out more gently, and not wash out the roots; using a watering-pot at the same time in each hand, it keeps a man better on the balance.

To combat that destructive insect and rust which have attacked and destroyed so much celery of late years, I find there is nothing equal to soot dusted all over the plants when the leaves are moist, so that it will adhere. For instance, I had the whole of the celery

attacked in these gardens last September, so that to all appearance it would be scorched up in a few days. It did not happen to be showery weather at the time, so I took the garden engine and gave it all a good washing, having a man to follow me dusting the soot all over it. Having thirteen rows in the garden, I dressed twelve of them twice, which perfectly cleansed them; the thirteenth is now remaining there scorched up from end to end as if it had been fired, without one head fit for use. I mean to allow this bed to stand for a time, that any gardener who may happen to call to see me may be convinced of the correctness of my remarks.

I have worked amongst many acres of celery: 13 acres are the most that I have cultivated in one garden during one season, but I have seen three crops taken off the same piece of ground in that time; and a great deal of it twice cropped with celery in the same season, which is of rare occurrence except in a London market-garden. Of course the plants must be well prepared and strong, and done justice to in planting with a good preparation: but a London market-garden is the place to see all things well prepared for.

Cauliflowers, as I have before told you, I make a point never to sow sooner than from the 18th to the 25th of September, sowing the seed in boxes, frames or pans, close to the glass. The last of my late cauliflowers I sow about the 15th October, in pans in a little bottom heat, and always make it a rule to prick at this season of the year in thumb pots first, having at this time plenty of spare pots that flower-garden plants have been turned out of. I keep them shifted on in some old melon mould until February, when the plants are become very strong; making it a rule to trench, ridge, and manure my first-cleared celery ground, for the purpose of placing hand-glasses for the first crop. When prepared, if the ground should be wet and cold, I take care to throw out a sort of trench the width of the hand-glasses; mark out a place for each glass; throw out a little of the earth where each glass is to stand, and put in a small quantity of dry dusty mould, old dry mushroom bed, or such like; which I always take care to have ready prepared in the corner of some shed, or covered up with straw mats, which are made by the men in rough weather. I always find in winter plenty of dry dusty rubbish handy and useful for saving many things from cankering, as

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well as for saving cauliflowers from getting black legs; which every grower is acquainted with, and by which disease many crops are lost. When the hand-glasses are prepared as above, I turn out about four of these large plants under each glass, keeping them well aired at all suitable times. They grow remarkably free, let the weather be what it may. If the weather proves dry in March, I get manure water prepared, put into it a quarter of a pound of nitrate of soda to one hog-head of tolerably strong cow-dung water, taking care to add to it a few gallons of hot water to make it a little warm, which well repays the trouble, for they will grow through the cold March winds like as in May, and fine cauliflowers I always get early in April. This season I find I did not have any account kept of cutting them until April 15th, but, by growing and shifting some along until I got them into No. 8 pots, and placing them for a few weeks in ainery that is just put to work on a peach house, I have had cauliflowers early in March. They are found very useful at that season of the year in every family, as they come before the spring vegetation begins to do much, and the winter stock is getting exhausted. I continue to sow just a pinch of cauliflower seed about every 20 day through the season, from the first week in January until the 15th October, and I have never been without cauliflowers one day since the 15th of April last. I have at this very time cauliflowers as close, fine, and white as they were in May last, with every appearance of having them as good until January next; having 200 fine plants of different ages potted in the large pots in which I grew my balsams, cockscomb- globe amaranthus, &c. and placed in the melon pits, &c. and other sheltered corners. These pots would be doing nothing at this time of the year, if I did not use them for this purpose. It is only to get up an hour earlier in the morning to get these extra jobs done, which is good for the health, and I think nothing of the trouble; it is a pleasure, and where there is a will there is a way. So, if you have no melon pits nor frames, it is always easy to throw out a 4 feet trench right and left, and form a home-made pit; getting some of your kidneybean sticks to put over it; and covering with mats, straw mats, heath, or fern.

Bicton Gardens, Nov. 21, 1842.— Loudon's Gardener's Magazine, for August 1843.

THE SALEP MISREFI PLANT.

Some of the *Orchideæ* were in ancient times considered to be vulnerary, and are still stated to be so in Persian works. But the most important product of the family, and one which deserves to be more extensively employed as an article of diet for the sick or the delicate in constitution, especially children, is the nutritious matter secreted in the tubers of many of the *Orchideæ*. These are well known in many places by the name *salep*, which is sometimes corrupted into *salop* or *salopp*. They are of a flattened ovoid form, semi-transparent, and thought, from their appearance probably, to be a gum by some ancient writers, but it is usually stated to consist principally of bassorine, some schell gum, and a very little starch, though the analysis is not yet definitively settled. Salep is often stated to contain the largest quantity of nutritive matter in the smallest space, and that about two drachms is sufficient for an invalid's meal. About sixty parts of boiling water are required to one of powdered salep to dissolve it.

The tubers of the *Orchideæ* have been used as medicinal agents from very early times, as we see from the works of Theophrastus and of Dioscorides, and their statements are repeated in the works of the Arabs. In these they are described under the names *khusyut-al-salib* and *khusyut-al-kulb*, literally *Testiculus vulpis* and *T. canis*, for which the Greek names assigned are *orkhis*, *saturyoön*, and *turphylla*, evidently the *αρχίς*, *Ζατυρόον*, and *τριφυλλόν* of Dioscorides. Several different kinds are mentioned, but as might be expected in a family like the *Orchideæ*, it is difficult to ascertain what were formerly the official species: indeed, even those of the present day are unknown. In the first place, it is uncertain whether the Greeks obtained their knowledge of the uses of these tubers from Eastern nations, or this was the result of their own observation. In the former case, the species must be extra European, and may be still unknown; but in the latter case, some of the European species, which have been employed as substitutes for Oriental salep, may be the original ones. Sprengel (Dioscorides ed Kuhn, ii. p. 553.) considers that *Orchis papilionacea*, L. which is at the present day called *σαλεπι* by the moderns, to be the *αρχίς* of the ancient

Greeks. The other plants, which are supposed to be alluded to, have been differently determined by different botanists, and are enumerated by Sprengel. *Orchis morio*, *mascula* and *militaris* give, according to M. Beïssenhirtz, the best salep in Europe; *O. maculata* and *latifolia*, a little inferior; but that of *O. bifolia* is stated to be of bad quality. Cullen, on the contrary, says, "I have seen it prepared in this country from *Orchis bifolia*, as pure and as perfect as any that comes from Turkey." In France, *salep indigene* is said to come chiefly from Nivernois. The Oriental salep is obtained in Europe from Turkey, Natolia, and Persia, but the plants which produce it are unknown. In India it is obtained from the North, that is Canbul and Cashmere, and sold at a high price even at the Hurdwar fair. On sending gardeners from the Saharanpore Botanic Garden, in company with the northern merchants, they found the salep plant in the hills, not far from the Jhilum, and near where the road from India to Cashmere crosses that river. The specimens in fruit, with tubers attached, which resembled the salep of commerce, appear to Dr. Lindley to be those of a species of *Eulophia*, and which I therefore ventured to name *E. vera*. The probability of this genus yielding salep is confirmed by *E. compestris*, which is common in and near the Kherce Pass, yielding some of very good quality, as I have proved by experiment, that is boiling for a short time, and afterwards carefully drying. This I was led to do, by hearing that the natives were in the habit of preparing and selling it by the name of *salep misree*, as a substitute for the larger and finer salep of Cashmere. Another kind seems to be prepared in the Himalayas, as Lieut. Hutton, in an account of an excursion to the Broang Pass, states, that "the grassy hills between Phagoo and Muttiana produce during the rains immense quantities of a species of *Orchis*, which the natives call *salep misree*, the roots of which are sometimes collected and dried, and afterwards brought to Simla, or sent to the plains for sale." The same statement is made respecting one of the *Orchideæ* at Mussooree, probably *E. herbacea*, which is common there. There is no doubt that very excellent salep might be prepared, both at the foot of and in the hills; while the genuine plant might also be introduced, if it already has not been so, by Dr. Falconer, from Cashmere. Great care would require to

be paid to the habits of the plants, as they take some years to come to perfection, so as not to eradicate them after being introduced; particular tracts of the hills might be cleared only in successive years, as is done with the cutting of fir or other forests grown for timber.—*Royle's Illustrations of the Botany of the Himalayan Mountains.*

NURMA COTTON.—THE COTTON FARM AT COIMBATORE —COTTON CULTURE AT DHARWAR

Extract from the Report of the Bombay Chamber of Commerce for the Fourth Quarter of 1842-43

Owing to the discrepancy existing between the opinion expressed by your Committee on the samples of Mhadhe Cotton of Nimar laid before them some time ago, and the Reports given on the Nurma Cotton of India (which two varieties Dr. Burn, the Superintendent of the Cotton Farm at Broach, Ind., by a mistake arising probably from the similarity of name, supposed to be identical,) two specimens of Nurma Cotton grown at Broach during the last season, were lately submitted to them by Government for opinion, accompanied by copy of a letter from Dr. Burn on the subject.

One of the specimens was in its uncleaned state—the other had been separated from the seed by a Native Churka Dr. Burn stated that he considered the latter to be “a very fine, soft strong, long, and clear-coloured staple, superior to the best Broach, and which would compete with the very best American short-staple cottons could it be produced in sufficient quantity.” Your Committee in reply expressed their concurrence in the opinion of Dr. Burn, as to the quality of the cotton, observing, that if it could be grown to the extent necessary for commercial purposes, it would prove a valuable acquisition to the trade, and that it was extremely advisable that steps should be taken to extend the cultivation of so choice an article of Indian produce.

The Cotton Farm at Coimbatore.

Your Committee have received from Messrs. W. & T. Edmond and Co. several samples of the cotton produced in this establishment, and

have derived much satisfaction from noting the results of some of the experiments.

The first specimens submitted were one of Indian and one of new Orleans Cotton—both of which were considered of good quality, but the American a good deal superior to the native, both in fineness and length of staple, and likely to bring Rs. 10 per candy more in this market. The latter possessed a short staple, and appeared to have suffered some injury in the ginning.

They afterwards received three samples, one of Native Cotton grown from Broach seed,—another of native cotton from Coimbatore seed, and the third from Bourbon seed. As to the comparative merits of the first and second of these, there was some difference of opinion; but both were generally considered decidedly inferior to the Bourbon variety, which was a beautiful cotton, both in colour and staple, and worth, notwithstanding the unfavorable state of the home markets, from Rs. 120 to 130 per candy. It was likely, they thought, to compete with fair New Orleans in the Liverpool Market, and Dr. Wight could not do better than devote his attention to the extension of its culture.

It appears that the cotton crops of the Coimbatore district were very inferior last season to those of former years; and the production of such excellent cotton at the Government farm is therefore the more satisfactory. The period for sowing commences this month, and as Dr. Wight proposes to be guided by the opinions of the Chamber in regard to the sorts of cotton to be preferred for cultivation, a considerable quantity both of the *Bourbon* and *New Orleans* varieties will doubtless be produced this season. These have always been considered by the Chamber as the kinds best suited for general growth in this country.

The gins used in the establishment answer extremely well, but are at present only worked by hand, the gin-house preparing for them, which will admit of the application of other power, not being yet completed. 2,00,000 lbs. of Cotton, however, have been ginned within two months, with three 25 *hp* gins. It would seem that the cost of cleaning by this means is much lower than by the common churka, the expence for labour for ginning 1,000 lbs. of seed cotton being only 1 rupee 14 annas, while the same quantity cannot be

cleaned by the native machine, at the most favorable times, for less than three rupees.

Cotton Culture at Dharwar.

Your Committee have also received one or two communications relative to the cultivation of Cotton at Dharwar, in which district, they are happy to perceive, efforts are being made to introduce superior varieties of the article. One of the best exotics suited to the climate and soil of India—the “Bourbon” species, grown so successfully by Mr. Elphinston at Rutnagherry—has been tried there with highly favorable results; and they think Government could not do better than adopt measures for the extension of its cultivation. It would likewise be advisable to take steps to secure its general culture in the Deccan, if it should be found possible to produce it in that part without deterioration of its quality from the dryness of the climate.

On the 3rd of June, a sample of American Cotton* grown at Hooblee, and forwarded by the Collector of Dharwar, was received from Government with a request for the opinion of your Committee on its quality and value as compared with native Broach Cotton in the Bombay market. This specimen had been “cultivated altogether on native principles,” and with the exception of having been hand-picked, had received no favour of any description—on the contrary it had been “planted too late in the season, and the flowers pulled too early, which had in some instances slightly stained the wool.” Your Committee’s opinion on it was, that it was of fair quality, but rather irregular staple, and that were any considerable quantity produced, it would bring about Rs. 10 to 15 per candy more than the best Broach then in the market.

On the 29th, your Committee were favored by Mr. J. R. Hadow, of the Firm of Messrs. Remington and Co. with two musters of *Bourbon* cotton, the produce of an experiment made at Dharwar. These were of excellent quality, both in colour and staple, though in the

* No particular description given.

latter point one appeared rather superior to the other. Such cotton, if brought to this market, would be worth at least 12 to 16 rupees per candy more than the cotton usually shipped from hence, and fully 15 to 20 rupees more than any Broach of the present season's crop. It had been beautifully cleaned.

Monthly Proceedings of the Society.

(Wednesday, the 18th October, 1843.)

William Griffith, Esq, Vice President in the Chair.

Members elected.

The gentlemen proposed at the last meeting were duly elected members of the Society; viz.—

As an Honorary Member.

Dr. Justus Liebig.

As Ordinary Members.

Lieut. Edward Close, Baboo Obychurn Mullick, Capt. Henry Cotton, Baboo Kissubchunder Roy, Messrs. C. C. Jackson, T. H. Lakin, J. O. Price and Richard Dodd.

For election.

The names of the following gentlemen were submitted as Candidates for election:—

E. Jenkins, Esq. Civil Service,—proposed by Mr. W. Quintin, seconded by the Secretary.

R. P. Sage, Esq., of Katgara Factory, Bongong,—proposed by Mr. A. Sawers, seconded by the Secretary.

T. C. Loch, Esq., Civil Service,—proposed by Mr. R. B. Garrett, seconded by Mr. H. G. French.

A. Wallace, Esq., merchant, Calcutta,—proposed by Dr. Mouat, seconded by the Secretary.

C. R. Jennings, Esq., of Galimpore Factory, Surdah,—proposed by Mr. Gilson R. French,—seconded by Mr. H. G. French.

Lieut. H. Rigny, Engineers,—proposed by Major DeBude, seconded by the Secretary.

E. Boyle, Esq., merchant, Calcutta,—proposed by Mr. C. S. Stowell, seconded by the Secretary.

Capt. G. B. Reddie, (29th N. I.) Asst. Commy. General, Necmunch,—proposed by Mr. C. S. Stowell,—seconded by the Secretary.

Presentations to the Library.

1. The Calcutta Journal of Natural History, Nos. 1 to 14. *Presented by Dr. McClelland.*

2. Journal of the Asiatic Society of Bengal for 1842. *Presented by the Society.*

3. Report on the settlement of the District of Gurhwal. *Presented by the Government of N. W. Provinces.*

4. Transactions of the Agri-Horticultural Society of Western India. No. 2, quarterly issue. *Presented by the Government of Bengal.*

5. The India Review and Journal of Foreign Science and the Arts. *Presented by the Proprietor.*

6. The Indian Record and Planter's Journal, Nos. 58 to 66. *Presented by the Proprietor.*

7. The India Journal of Medical and Physical Science, No. ix. of vol. 1. *Presented by the Proprietor.*

Garden and Museum.

1. Seed of the Madia Sativa, raised at the Government Botanic Garden at Dapooree. *Presented by Dr. Gibson.*

Dr. Gibson presents this small supply of seed for distribution on this side of India. The very dry climate of the Deccan, Dr. Gibson states, is unsuited for the plant, but he sees no reason why it should not thrive in other localities.

2. A superior description of Barley from Darjeeling. *Presented by Dr. Campbell.*

3. Samples of sun-dried Salep Misree procured in the neighbourhood of Kotrah, near Odeypore. *Presented by Lieut. J. C. Brooke.*

With these samples, Lieut. Brooke has forwarded an interesting paper descriptive of the country where the plant exists, together with other particulars on the subject. This communication was referred to the Committee of Papers. The samples were considered to be of the best description of Salep.

4. Seed of the Asparagus Bean. *Presented by Mr. Piddington.*

5. A quantity of Bhilsa Tobacco seed raised in his garden at Kidderpore. *Presented by Baboo Suttchurn Ghosaul.*

6. Three small boxes of English Tulip Bulbs.

Sugar Cane Distribution.

A memorandum from the Overseer of the Society's Garden was submitted. It mentions that about twenty thousand Canes, consisting of the Otaheite, Singapore, Bourbon and China varieties, are ready for cutting. It was agreed that these canes should be forthwith advertised for distribution at the same charge as that of former years; viz. one anna for each cane, which charge is to include the expense of straw-bands for securing the canes in bundles.

Reports.

A report on Tea, the produce of Chittagong, and on Wheat from Bolundshohur, the produce of Egyptian seed, were read. (See page 409.)

Indian Wheat Question.

The Secretary drew the attention of the meeting to a memorandum from Mr. Speede 'relative to the question of admission of Indian Wheat into British ports on an equal footing with that of Canada.'

Mr. Speede states, that his object in submitting this memorandum is to induce the Society to make an early reference on the subject to those parties in England, who are known to be favourably disposed to the measure. He then enters at some length into particulars connected with the passing of the Canada wheat and flour bill into a law; alludes to the claims of India for an equal admission of her wheat into the home market, and concludes by 'soliciting the aid of all members to bring the matter to a conclusion, so as to proceed with as little delay as possible to frame our several addresses, and bring them forward for the opinion of the Society.'

The Secretary intimated that in accordance with the recommendation of the report of the Wheat Committee, which was confirmed at the General Meeting in June, circulars were addressed to members in various parts of the country. A few replies only had, as yet, been received, several of the members were at a considerable distance, and some delay in obtaining answers was naturally to be expected; consequently it was probable, that further information would be afforded in due time.

Resolved. That the replies already received by the Society, and the paper now submitted, be circulated to the Committee, with a view to

determine, if the information on hand be sufficient to admit of their recommending the carrying into immediate effect the suggestions contained in Mr. Speede's memorandum.

The Secretary called the attention of the meeting to a passage at the commencement of Mr. Speede's minute, in which he mentioned that he had applied that the papers which had been received might be handed over to him, and that he had not been prepared for the application being unsuccessful. The Secretary stated, he had not felt himself at liberty to part with papers of importance addressed to the Society before they had been laid on the table. The Committee appointed by the Society could of course have had them at any time, but he thought he was not justified in handing them over to a single member. The meeting thought the Secretary had acted properly.

The Cacao Plant.

A letter from Mr. Stikeman, Secretary of the East India and China Association, was next submitted. Mr. Stikeman mentions, that after the despatch of his former letter, (which was submitted at the last meeting,) he had put himself in communication with Dr. Royle, and made him acquainted with the Society's wishes for procuring nuts of the Cacao, and that at a subsequent interview Dr. Royle had informed him, that he had written to some friends in the West Indies on the subject. Mr. Stikeman adds, that it will afford considerable gratification to the Association to know, that the result has been successful.

The Secretary stated, that with reference to the letter of Mr. Sconce, which was read at the last meeting, he had the pleasure to submit a note from Mr. Wray, enclosing a letter from Captain Marquard, communicating the transfer, for the Society's Garden, of the greater portion of the Chocolate trees now in his garden at Chittagong. The best thanks of the Society were directed to be given to Captain Marquard, for this acceptable contribution.

Bhauglepore Agricultural Society.

Major Napleton, the Secretary of the Branch Agricultural Society at Bhauglepore, intimates the receipt of a large assortment of seeds which was furnished by the Parent Society, and tenders best thanks for the same. Major Napleton adds, that the public garden, and every

thing connected with the Institution, is in a flourishing and satisfactory state. The number of monthly subscribers has reached 109, and the donation book shews a collection of about 1,200 Rupees.

Letters were read from Dr. Gibson, at Dapoorree, forwarding a report of trials made of the power of Bramah's Hydrostatic Press, as applied to the extraction of oil from the Earth Nut, Carthamus, Flax, Sesamum, Castor and other seeds; and from Mr. O'Riley at Amherst, submitting a memorandum relative to a prospectus of a Joint Stock Coffee Company at Chittagong, which was published in a late number of the Journal. Both communications were transferred to the Committee of Papers.

For all the foregoing letters and presents, the thanks of the Society were accorded.

Observed at 9 h. 50 m.				Observed at 4 p. m.				Rain Gauges. Observations made at 8 1/4 m.				Observations made at 10 F. M.			
Temperature.		Wind.		Temperature.		Wind.		Upper.	Lower.	Barometer.	Temperature.		Barometer.	Temperature.	
Of the Mer- cury.	Of the Air.	Of the Surface.	Direction.	Of the Mer- cury.	Of the Air.	Of the Surface.	Direction.				Of the Mer- cury.	Of the Air.		Of the Mer- cury.	Of the Air.
Inches.	°	°		Inches.	°	°		Inches.	Inches.	Inches.	°	°	Inches.	°	°
29.508	83.5	87.0	83.5 E.	29.541	88.5	86.4	82.3 E.	0.07	0.08	29.652	85.25	84.25	29.652	85.25	84.25
586	83.6	85.0	83.3 E.	576	83.4	84.0	81.0 E.	0.07	0.08	700	86.5	85.5	700	86.5	84.75
584	83.5	85.0	84.0 E.	478	83.1	83.1	81.0 E.	0.27	0.34	660	86.5	84.75	660	86.5	84.75
585	83.5	84.0	84.0 E.	529	82.5	83.7	81.0 E.	0.11	0.15	770	86.5	84.75	770	86.5	84.75
606	83.4	85.0	82.0 E.	553	81.3	81.6	79.0 E.	0.17	0.21	770	86.5	84.75	770	86.5	84.75
641	82.4	84.8	82.0 E.	583	82.6	83.9	81.0 E.	0.03	0.07	725	86.5	84.75	725	86.5	84.75
666	81.9	83.9	83.9 E.	567	83.5	85.0	82.5 E.	0.06	0.11	700	86.5	84.75	700	86.5	84.75
651	84.2	87.0	82.6 S.	566	83.5	85.0	81.5 W.	0.08	0.10	700	86.5	84.75	700	86.5	84.75
643	83.2	85.0	83.4 E.	543	86.6	91.3	81.7 S.	1.18	1.37	700	86.5	84.75	700	86.5	84.75
588	83.5	86.0	84.9 N.	510	80.6	79.0	77.4 W.	2.29	2.14	700	86.5	84.75	700	86.5	84.75
522	81.6	82.2	81.0 N.	434	84.5	86.0	85.0 N.	0.36	0.44	730	86.5	84.75	730	86.5	84.75
566	80.6	81.0	80.3 W.	503	83.5	85.0	84.4 W.	0.97	1.10	730	86.5	84.75	730	86.5	84.75
673	82.4	86.0	81.3 N.	618	84.5	87.8	83.0 N.	1.00	1.08	730	86.5	84.75	730	86.5	84.75
702	82.4	86.0	81.3 N.	697	84.5	88.2	83.0 N.	0.5	0.06	730	86.5	84.75	730	86.5	84.75
781	82.4	87.0	83.1 N.	710	85.6	91.0	85.0 W.	0.43	0.48	730	86.5	84.75	730	86.5	84.75
786	83.5	88.9	83.2 S.	698	86.5	93.0	87.0 W.	0.39	0.44	730	86.5	84.75	730	86.5	84.75
757	84.4	88.8	83.2 S.	697	87.0	89.8	87.0 W.	0.29	0.36	730	86.5	84.75	730	86.5	84.75
794	84.4	89.0	83.2 S.	706	83.9	89.8	87.0 W.	0.29	0.36	730	86.5	84.75	730	86.5	84.75
753	83.6	89.9	84.0 W.	641	84.7	85.0	84.1 S.	0.43	0.48	730	86.5	84.75	730	86.5	84.75
738	81.0	90.5	84.0 W.	649	85.2	88.4	83.0 S.	0.39	0.44	730	86.5	84.75	730	86.5	84.75
782	81.0	91.0	85.2 N.	702	86.6	89.0	84.8 N.	0.29	0.36	730	86.5	84.75	730	86.5	84.75
525	84.5	91.0	84.0 S.	753	83.9	92.0	80.0 N.	0.59	0.65	730	86.5	84.75	730	86.5	84.75
798	85.4	91.0	85.3 N.	733	87.5	93.0	82.4 W.	0.29	0.36	730	86.5	84.75	730	86.5	84.75
793	84.6	88.3	84.0 S.	673	87.4	91.0	85.2 S.	0.29	0.36	730	86.5	84.75	730	86.5	84.75
750	81.5	87.0	83.2 S.	668	82.0	79.2	77.0 E.	0.29	0.36	730	86.5	84.75	730	86.5	84.75
729	83.5	90.2	85.0 N.	682	84.5	86.1	82.1 W.	0.29	0.36	730	86.5	84.75	730	86.5	84.75
775	83.5	85.0	81.2 E.	657	84.6	86.9	82.1 W.	0.59	0.65	730	86.5	84.75	730	86.5	84.75
714	79.9	79.0	77.0 N.	658	81.5	81.2	79.6 N.	0.29	0.36	730	86.5	84.75	730	86.5	84.75
755	80.7	77.5	77.0 N.	689	85.5	89.3	80.2 S.	0.29	0.36	730	86.5	84.75	730	86.5	84.75

From a comparison of the two (centres, the Mercury in that at the Dispensary stands 1/10th of an in. higher than that at the Surveyor General's Office

Correspondence and Selections.

REPORT ON SAMPLES OF WHEAT AND OTHER PRODUCTS FROM
HOSUNGABAD.

From Lieut. Col. J. R. OUSELEY, dated Chota Nagpore, 15th October, 1843, to the Secretary of the Agricultural and Horticultural Society.

With reference to my former notes I have the pleasure to send by blangy dak, the following wheat and other grains:—

- 1 Julalva wheat
- 2 Kutya ditto
- 3 Satya ditto, (cut 60 days after sowing.)
- 4 Sohalya ditto
- 5 Pissee ditto.
- 6 Chenna, common, (Boot gram.)
7. Ditto, Parbuttya, (White gram.)
8. Ulsee, or Tissee, (White Linseed.)
9. Til, white, (Sesamum.)
10. Ditto, black, (ditto.)
11. Ditto, Mughy, (ditto cut in the month of Magh.)

These I request you to have the goodness to present to the Society. I am convinced finer grain is not to be had; all these are produced in Hosungabad, from whence they have just arrived.

To Messrs. THOMAS LEACH, WILLIAM STORM, and CHARLES HUTTENAGLE.

DEAR SIRS,—With reference to the following extract from the

<p>No. 1. Julalva Wheat 2. Kutya ditto. 3. Satya ditto 4. Sohalya ditto. 5. Pissee ditto. 6. Chenna (common) 7. Ditto (Parbutteah) 8. White Linseed. 9. White Til. 10. Black ditto. 11. Mughy ditto.</p>	} } 	<p>Proceedings of the last General Meeting of the Society, I have the pleasure to circulate the wheat and other samples noted in the margin, together with Colonel Ouseley's communication on the subject, and solicit the favour of your report thereon.</p>
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I am, Dear Sirs,

Yours faithfully,

*Agricultural Society's Room, Town-
Hall, Chota Nagpore, 1843*

JAMES HUMF,
Honorary Secretary

Extract from the Proceedings of a General Meeting of the Agri-Horticultural Society, held on the 8th November, 1843.

(Several samples of wheat and other grain, the produce of Hosungabad, were presented by Colonel Ouseley.)

“The Secretary informed the Members, that in September 1839, some samples of the same varieties of wheat, gram, and til, were presented by Colonel Ouseley; and that at the subsequent meeting, in October, the Agricultural Committee, to whom the grains were referred, gave in a favourable report on them. The wheat in particular, was pronounced “superior to any the Members had before seen in India, both kinds (the Julalya and Kutya) weighed full sixty pounds to the bushel.” The white til was also stated to be very good.

“It was proposed by the President, and unanimously *resolved*, that the best thanks of the Society be given to Colonel Ouseley for these samples. Further, that they be referred to the same Members who reported on the former samples, with a view to determine if any deterioration or improvement has taken place during the last four years.”

MINUTE BY MR. CHARLES HUFFNAGLE.

December 4, 1843.—I have looked over the samples of grain sent round for inspection, forwarded to the Society by Colonel Ouseley, five varieties of wheat, gram, linseed, and til seed. It is to be regretted, that we cannot from the small quantity of each muster, very accurately judge of the probable weight per bushel of the wheat, as I believe this is the best test of its quality, and the standard by which it is valued in Europe and America. The grains of each variety (although some have been injured by the weevil,) are full, slip readily through the fingers, and are of large size. The specimens which appear to me most suitable for the English market are the

“Pissee” Wheat.

“Sohalya” ditto, (numbered 4th class,) and the

“Julalya” Wheat.

These in the order I have marked them; they seem to be a *whiter*

where *white* flour is desirable. The other samples would, however, I think, yield more "Soojee" in proportion. The "*Sohalya*" has been chiefly attacked by the weevil, which proves it to be of a softer grain.

MINUTE BY MR. THOMAS LEACH.

Dec. 5th.—I have marked on the letter in pencil, the weight per bushel of these grains of which there is a sufficient quantity to fill the measure of the grain balance, all the wheats are heavy. Only one, No. 4, being below the average of the English, the others are all above. The white linseed is also very fine.

MINUTE BY MR. WILLIAM STORM

Dec. 6th.—I have looked over the wheat, til, and gram seeds, and I am of opinion, they have fallen off sadly. Class 1 and 4 wheats are the best, and the white til seed is good.

Extract of a Letter from WILLIAM HAWORTH, Esq., dated Cossipore, 10th December, 1843, to the Secretary of the Agri-Horticultural Society.

I have much pleasure in complying with your request, as conveyed in your note of the 6th instant, and now beg to annex my report upon the samples of wheat, &c. you then sent me, and which I now return per bearer.

Report upon the Samples of Wheat, &c. sent to the Agricultural Society, by Colonel OUSELEY

No. of Sample.	Name of Grain.	Name of the Grain in the Calcutta bazar.	Lbs. per bushel.	REMARKS
No.				
1.	Julalya,	Gungajelly, ..	61	A fine grain, good colour and thin skin, but the hardest flinty wheat I ever met with; it would make excellent Soojee, it would make good sizing flour for the cotton manufacturer in England, as it contains a large proportion of gluten, but would be an expensive grain to grind, from the great power required to break it down, it would be necessary to damp it with water or by a jet of steam; it would not be of much value in England except to mix with bad conditioned wheat; it is not unlike the Mediterranean wheats.
2.	Kutya,	Mixed Doodea and Gungajelly,	60	This sample is in bad condition; it would be a suitable article for the Calcutta market when new, but it contains too much of the hard flinty grains for the English market.
3.	Satya, ..	Gungajelly, ..	60½	(Cut sixty days after sowing.) It is a fair sized, hard, flinty, dull coloured grain, contains much gluten and little starch; it is not a suitable wheat for the English market, but would answer for Calcutta; it would make a very dark coloured flour of little value, except for sizing purposes.
4.	Sohalya,	Good Doodea, slightly mixed with Gungajelly,	57½	This is a good white grain and a suitable wheat for most markets; it is more like English wheat than any of the former samples, it would make a fair quantity of flour; it is slightly mixed with flinty grains, in other respects it is a <i>soft</i> wheat, easily ground, and contains a large portion of starch and little of gluten.
5.	Pissee,	Doodea,	63	This is a very fine specimen of soft white wheat, and if it could be got home in good condition, free from weevils, it would be as valuable as the best kinds of English wheat, it contains a great proportion of <i>starch</i> , this would make a fine quality of flour at a little expence in manufacturing.
8.	White,	Linseed,		This is a novel kind of linseed which I never before met with; it appears a rich grain, and I should think it would produce a large quantity of very pure oil, and be consequently valuable to the oil crusher.

I have little or no knowledge of the other kinds of grain sent to me, except that I would call the common grain *very good*.

WM. HAWORTH.

NOTICES REGARDING ASSAM CASSIA.

Extract of a letter from WILLIAM GRIFFITH, Esq., dated 9th November, 1843.

“ The accompanying is a specimen of cinnamon (cassia ?) from Major Jenkins; if the Society can obtain an opinion regarding its value, Major Jenkins will be interested.”

Extract of a letter from J. RENNIE, Esq., dated 22nd November, 1843.

“ The specimen you sent appears similar to China cassia, but of inferior quality, as compared with what is usually exported from thence. The flavor is pretty good, but the external appearance is so coarse, and the bark so thick, that its value is greatly depreciated, and I quite agree with Mr. Terry, whose report I enclose.

The specimen of cassia you have sent me is of inferior quality, it is too coarse both in thickness and flavor for the English market, though it would sell there at a price, say 50s. per cwt.

I expect this specimen is from the real China cassia tree, but it must be more carefully scraped and rolled, to compete with the China article. You must not calculate on the above price, as it varies continually and considerably.

(Signed) CHARLES TERRY.

Extract of a letter from A. H. LANDERS, Esq., dated Calcutta, 30th November, 1843.

A few days ago you shewed me a sample of cassia, which you mentioned had been lately sent down by Major Jenkins, Commissioner of Assam. It has since occurred to me, as I have had a little experience with the article, that a few particulars on the subject may possibly prove of interest, and, under this impression, I have the pleasure to communicate them.

The specimen in question, from the little examination I gave it, appeared to me to be coarser and worse prepared than the generality of cassia which I have seen brought to the plains of Upper Assam

by the Nagas', it is not, however, an article of trade in Upper Assam. During my sojourn amongst the Nagas, quantities of cassia were almost daily offered me, as presents, along with the root of some shrub, called by my servants *curfool*, or some name similar to it, which tasted exactly like cinnamon. The wild cassia grows luxuriantly, and is indigenous along the second range of the Naga hills. The places where I found it most plentiful, are Tublong, Chackting, and Nokangies. I have also had specimens brought from the Abor tribes of Yung-yack, Tangsee, and Tamlow. The cassia is likewise found in the Cossya hills, and prepared by the inhabitants for the market. Moreover, I have seen several Mogul merchants attending the Cherraponjee bazar, for the express purpose of purchasing cinnamon. About three years ago I sent a sample to my agents in Calcutta, to ascertain its value in the Calcutta market, the following is extract of their reply. I give it as it may be interesting to compare with the report (should the Society obtain one) on Major Jenkins' specimen:—

“ I lose no time in replying to your request respecting the prices likely to be obtained here for such cinnamon and pepper as you sent us. The package only came to hand yesterday afternoon, and I regret much to say, the cinnamon was in such a damaged state from the package having got wet in its transit, that we find it difficult to ascertain what price it would obtain if sent down here in good order. I think, however, you might calculate on getting about Co's. Rs. 16 per bazar maund; it is at present very scarce. The pepper is of a good quality, and could be sold freely here at about Co's. Rs. 9/8 per factory maund. If these articles can be got in quantities, I think it would be worth your while trying them, or at least a small speculation in each.”

I was informed on enquiry, that the Mogul merchants mix this article with the cinnamon of Ceylon, and sell it as the produce of the latter place, and thereby realize a handsome profit.

Extract of a letter from Dr. ROYLE, to the Secretary of the Agricultural Society, dated India House, London, September, 1843.

‘ As I did not specify to Mr. Groom for how many months he was to proceed with the sending of bulbs to you, he has sent three more boxes for this mail. They will yet be in time for you to distribute, and for them to flower before your hot weather comes in, but as this is an experiment, you must let me know how they succeed, and which are the best months for sending them to you, that is, according to the time they will require in your climate for coming forward.

Another bulb, more an useful than an ornamental one, has lately attracted some attention here, and that is the onion from Himalayan seed. Some districts in the Himalayas are famous, as you probably know, for their onions. Some of the seed of those onions was sent to the India House from the Scharunpore Botanic Garden last spring. I sent it to several people, but especially to Mr. Wrench, who is one of the principal seedsmen in the metropolis. He had it grown, and when in a fit state for use, had it taken to the purchasers in the market of such things. They would have nothing to say to them, because they were reddish coloured externally, and English experience is against all onions of that appearance being good, but, on testing, these onions were pronounced excellent, being mild in taste and well flavoured. I sent them to Dr. Lindley, who had them examined by the gardener, Mr. Thompson, of the kitchen department of the Horticultural Society. Mr. Thompson says it appears to be the Madeira seed onion in every respect, and he fancies that the Madeira seed has made its way to the Himalayas, but this is certainly not the case. The Himalayas have long been celebrated for their onions. I mention the fact to you, that you may get seed for the Society from the proper district, by applying to Dr. Jameson of the Scharunpore Botanic Garden, and I am sanguine in thinking, that you might grow a variety of seeds for the kitchen vegetable in different parts of India, which would answer as well as many of your importations. But it

good supply I hope we shall be able to get a paper on the Himalayan onion seed in the *Gardener's Chronicle*."

[The onion alluded to in the above communication, is probably identical with the "*Sreenuggar onion*." In September 1841, the Society was put in possession of a large supply of this seed, through the kindness of Major Stuart Corbett, Commandant of the Kemaon Battalion at Lohooghaut; and again, at the close of last year, a further quantity was presented by the same gentleman. This seed has been distributed very widely during the last two years. In his communication, forwarding the first supply, Major Corbett gives the dimensions of some onions grown from this seed, in Captain Huddleston's garden; they averaged 12 inches in circumference, and weighed 22 tolahs, and were moreover very mild to the taste. It appears from the Transactions of the Society (vol. 2, page 163,) that so far back as 1835, this onion was brought to the notice of the Society; for, in a communication to Dr. Wallich, Mr. Traill, the Commissioner of Kemaon writes, "the Sreenuggar onions are noted for their size and mildness, when the seed ripens a supply shall be sent you"]

PROGRESS OF THE BRANCH AGRI-HORTICULTURAL SOCIETY, AT
BHAUGLEPORE.

*From Major T. E. A. NAPLETON, Secretary Bhauglepore Branch
Agri-Horticultural Society,*

To JAMES HUME Esq, Honorary Secretary to the Agricultural and Horticultural Society of India.

DEAR SIR,—I have much pleasure in transmitting, for the purpose of being laid before the Parent Society, the proceedings of a Meeting which was convened on the 5th instant, for the purpose of inspecting the accounts and transacting other business connected with the Bhauglepore Branch Agri-Horti. and Floricultural Society.

I also enclose an account of our show of flowers, fruit and vegetables, which took place on that evening in the show rooms lately erected in the Public Garden.

The survey and plan of the garden being now completed, I shall take an early opportunity of forwarding it to you for the purpose of being submitted to the Hon'ble the President and Members of the Parent Society, with our hope that it may meet their approbation.

The Darjeeling barley, sent for sowing in the Public Garden, has

English wheat and barley, sent also experimentally, was sown the same day as the Darjeeling barley, but has not yet made its appearance above ground.

The hemp seed and acclimated flax seed sent us by you from the Parent Society proved old, and did not germinate, although every precaution in preparing the soil properly was bestowed.

The cotton, particularly the Georgia, has come up beautifully, and there is a magnificent crop of white gram in the Public Garden.

The tobacco seed sent by the Society,—Cuba, Bhilsa, and Gibali, all came up excellently well. A begah of ground has been planted out in the Public Garden from these plants, and there are several thousand plants ready for distribution.

Our English seedsmen, Vetch and Sons, Exeter, Devonshire, have sent us a magnificent batch of flower and vegetable seeds per Overland route, together with lucerne, clover and grass seeds; Manzul Wurzel, and many other valuable things by the "*Agincourt*."

Their charges are most reasonable, and their seeds so fresh that they came up freely the fourth day after sowing, and I strongly recommend these well known seedsmen and florists to the notice of the Parent Society, for from long experience I have found nearly all Cape seeds turn out very badly.

My mode of sowing English seeds is as follows:—Sow in moderately moist and well prepared ground, cover in the seeds slightly with a *coorpee*, and then sprinkle a basket of old ashes over each bed. Irrigate forty-eight hours after sowing, and again a week afterwards. Under this treatment our Overland seeds are bursting forth in great style.

A Nursery of several thousand cuttings of shrubs and plants of choice kinds is nearly completed, and there is scarcely a yard of ground in the Public Garden (14 begahs) uncultivated. Our crops of Madras, Futtighur, Dinapore, and Darjeeling potatoes, (the latter by the bye are by far the finest I have met with in India,) are very promising, and some of them are now ready for table use.

Vegetable marrow in great perfection, and Windsor beans and scarlet runners are in blossom.

I remain, Dear Sir,

Your's very faithfully,

T. E. A. NAPLETON,

BHAUGLEPORE BRANCH AGRI-HORTI, AND FLORICULTURAL
SOCIETY.

A Meeting of the supporters of this institution took place in the Public Garden, at 4 o'clock P. M., on the 15th day of November, 1843, and was most numerously attended, there being between 40 and 50 subscribers present.

G. F. Brown, Esq. was voted to the chair, and occupied it accordingly. The Secretary then read the receipts and disbursements since last Meeting on the 10th of May 1843, together with a list of 43 additional Monthly Subscribers, as well as extra donations, amounting to 371 Rs.

MEMORANDUM.

Amount of Monthly Subscriptions to the 30th of

November, 1843,	Co's. Rs.	1159	0	0
Amount of Donations up to ditto ditto, .. .. .	.. .. .	1175	0	0

	Total, Co's. Rs.	2334	0	0
Expenditure up to the 1st November, 1843... ..	.. .. .	2255	0	0

Balance in favour of the institution, Co's. Rs. 79 0 0

The Secretary then informed the Meeting, that the following items of work remained unaccomplished, for completing which the sum of about 200 Rs. would meet the expenses.

- 1st. One more Well in the Horticultural Department.
- 2nd. One extra pair of Bullocks.
- 3rd. Finishing the Chevaux de Frise round the Garden.
- 4th. For constructing a few more pukka Gutters, and such like items.

Proposed by F. E. Reade, Esq., and seconded by Dr. Leckie,—That the thanks of the Meeting be offered to the Secretary for his indefatigable exertions in planning and laying out the Garden, and bringing it to its present flourishing condition,—carried unanimously.

The Secretary returned thanks.

G. F. Brown, Esq. then addressed the Meeting as follows :—

GENTLEMEN,—Though it may not be considered quite regular for the Chairman of a Public Garden to move any resolution for general adoption, yet I hope you will hold me excused for doing so on the

present occasion. You have just passed a vote of well merited thanks to our indefatigable Secretary but I wish you to do something more than this; I wish you to prove by deeds not words how grateful you feel for his meritorious exertions. You all know that a year ago such a Society as this was never thought of at Bhagulpore, and that six months ago our present flourishing Public Garden was an indigo field. Within this short period the ground has been purchased and cleared, walks have been made, wells dug, show rooms built, trees planted, flowers of all descriptions brought from Calcutta, potatoes from Futtighur, cotton from the East, tobacco from the West, and all sorts of rare and valuable seeds from England.

For all this I tell you again and again, we are indebted to Major Napleton.

But more than this, we owe it to Major Napleton's zeal, constant supervision, and good management, that twice as much has been effected with the money which we subscribed towards the undertaking than we could have reasonably expected. He has made Rupees 500 go as far as another would have done Rupees 1000.

Now then as it appears that some little matters are wanted in order to complete the objects which Major Napleton has in view, I think that we cannot better show our gratitude to him for his valuable services than by making up the small sum required for the purpose. A few Rupees from each Subscriber will be sufficient, and will be the best proof we can give of our rightly appreciating Major Napleton's successful exertions.

[A Subscription was immediately entered into, which amounted to Rs. 220.]

The Secretary then offered his best acknowledgments to the Chairman and Gentlemen assembled, and assured them, that he was most amply repaid for his humble exertions in the handsome compliment just passed upon him, and assured them that he would continue to devote his best attention to the interests of the Society.

[Here follows a goodly list of Donations of plants and seeds since May, 1843.]

Proposed by Major Napleton and seconded by F. E. Reade, Esq.—That a vote of thanks be given to Mr. A. Smith, Assistant Revenue Surveyor, for the trouble he has so kindly taken in surveying and drawing a plan of the Public Garden, the latter being beautifully executed in water colours —carried unanimously.

Proposed by Major Napleton, and seconded by G. F. Brown, Esq.—That the best thanks of the Society be offered to Capt. Don, for the great assistance he has rendered the Secretary in many instances during the last six months,—carried unanimously.

Proposed by Dr. Leckie, and seconded by the Secretary,—That the best acknowledgments of the Meeting be proffered to the Chairman for his able conduct in the Chair.—carried unanimously.

The Meeting then broke up, and the Members of it adjourned to the Show-rooms, to inspect the *dallees* of flowers, fruit, vegetables, &c. The ladies of the station, and a great number of visitors honored the Society with their presence. The Rev. J. McCallum, F. E. Réade, Esq., and Mr. Richardson were elected umpires, and the appended list of prizes were contended for.

[This list is too long to be added to the report. It may however be mentioned, that prizes were awarded for the best samples of beet root, peas, lettuce, carrots, turnips, asparagus, potatoes, pot herbs, ginger, arrowroot, Jerusalem artichoke, Cabool clover; for fruits and flowers of various kinds.]

In the Floricultural Department, the following specimens attracted much and deserved attention; viz. the silver creeper in full blossom, this perhaps is one of the most chaste and lovely things amongst the beauties of Flora; a splendid bouquet of Dahlias of seven different colours next met the eye; the show of Zinnias came next, and were magnificent in their growth, and varied and beautiful in their colours; several specimens of the Yuca Gloriosa came next, and the magnificence of the plant, delicate colour, and very perfect and bell-shaped flower, called forth the admiration of many.

There were some choice specimens of the Russelia juncea, sweet briar, euphorbia, roses of five sorts, myrtle in full blossom, the passion flower family in different varieties, cum multis aliis, including the verbenas.

In the Vegetable department, there was a very fair show, allowing for damage done to the gardens by some very heavy rain which fell last month.

The awarding of the prizes having been completed, the party left the Show-rooms, and walked over the Public Garden, the whole of which is now in a high state of cultivation.

A batch of seeds per Overland Mail, from Vetch and Sons, Exeter, Devonshire, has been received in excellent order, and sowings are

going on; seakale, brocoli, Swede turnips, asparagus, nolo kole, turnip, radish, parsnip, Brussels sprouts, victoria, giant and coss lettuce, in the Horticultural Department. Venera, fuchias, sweet william, double stock, alpine auricula, polyanthus, anemone, ice plants, nasturtian, geranium, laburnum, and many other choice flower seeds are amongst these, and a very large supply of seeds and bulbous and tuberous roots are expected in the ship "*Agincourt*" shortly, and by January next, the Horticultural Department is expected to be in fine order.

(Signed) G. F. BROWN,
(True copy) *Chairman.*
T. E. A. NAPLETON,
Secretary.

PROSPECTUS OF A WORK ON THE COMMERCIAL PRODUCTS OF INDIA.

[The Committee of Papers have much pleasure in giving publicity, through the medium of the Journal, to the following Prospectus of Dr. Royle's new publication on the Commercial Products of India. The Prospectus enters so fully into the nature and objects of this intended work, that it is only necessary for the Committee to recommend it to the attentive perusal of every Member of the Society, and to express the hope, that the author will meet with the assistance he seeks, and which the usefulness of the publication so fully merits.]

Extract of a Letter from Dr. ROYLE, to the Secretary of the Agricultural Society, dated India House, London, September 1843.

"I enclose you a few Prospectuses of a new work in which I am engaged, and which I hope will be useful to practical men desiring to become acquainted with the products of India, and the names by which they may be obtained. These Prospectuses are issued for the purpose of collecting information, and all kinds will be gratefully acknowledged. The work will be in parts, the first on timber trees and cordage plants."

Prospectus of a work on the Commercial Products of India. By
JOHN FORBES ROYLE, M.D., F.R.S., L.S., and G.S.

The British Empire in India, from its great extent, and its diversity of surface, as well as from its variety of soil and of climate, has often been described as capable of producing within its own limits almost all the useful products of every other quarter of the globe.

This statement may be considered, by many who are unacquainted, and even by some who are partially acquainted with the subject, as one of those vague assertions and hasty generalisations which are so often brought forward to round a period, or to effect some temporary object: and which are never attempted to be proved, for the authors themselves are well aware that they are incapable of demonstration. That this is not the case with the statement, either of the productiveness or of the capabilities of India, can be satisfactorily shewn.

The author, in his work entitled "*Illustrations of the Botany and other Branches of the Natural History of the Himalayan Mountains*," took a more extensive view of the subject than could be inferred from the title of the work; inasmuch as, though treating specially of the botany of the above mountains, he contrasted this, throughout, with that of the plains of India, and compared each of these with that of other parts of the world to which it was similar. If the great extent of India be considered, and the warmth of its climate, diversified by moisture in the southern and dryness in the northern parts, it will be evident that the basis was sufficiently extended for correct comparison with other hot parts of the world, whether in Asia, Africa, or America. So also with the mountains, especially the Himalayas, which afford a climate tropical at their base and polar at their summits, with, at their several elevations, every intermediate variety which we meet with in proceeding from the equator to the high latitudes of either hemisphere. These different climates are accompanied by an equally diversified vegetation: such vegetation being there met with as is most suitable to each of the climates. And this is often, if not usually, similar to that of some other parts of the world where a like climate occurs.

After these investigations and comparisons, founded on examination of the soil, climate, and vegetation, the author felt himself entitled to draw legitimate conclusions, and proceeded to point out the different parts of the country where the useful plants of other parts of the world might be successfully cultivated. As an instance, it may be sufficient to state, that after a comparison of the vegetation of India and the Himalayas with that of China, he recommended, first in 1827 and again in 1834, the cultivation of Tea in the British Himalaya provinces, that is, in Kemaon and Gurhwal. It is gra-

tifying to be able to state, that this year has brought the first specimen of tea cultivated and prepared in the province of Kemaon, and which has been pronounced of excellent quality in this country.

Several attempts (some of them successful and others unsuccessful) having been made at different times, both by the government and by individuals, to improve the quality and increase the quantity of the principal articles of Indian commerce, as well as to introduce others, the author endeavoured to investigate the causes of success or of failure, in his "*Essay on the Productive Resources of India.*" He came to the conclusion that, some of the causes of failure were, unsuitableness in the methods of culture to the soil and climate where the experiments had been made; others, that the modes of preparation adopted were equally unsuited to the objects to be attained. After much investigation, he considered it certain, that by due attention to the principles of science as applicable to the arts of culture, most of the staple articles of commerce—as Cotton, Flax, Hemp, Tea, Coffee, and Tobacco—might be successfully cultivated in India. As Silk, by continued perseverance, had succeeded, and had consequently become a considerable article of commerce, so Wool was likely to become a principal article of export. Though treated of in the above work, it is hardly necessary to mention Rice, Sugar, Indigo, Opium, and such Spices as Pepper and Cardamoms, because they are already produced of good quality, though the culture of some of them might no doubt be improved.

In an "*Essay on the Production of Isinglass on the Coasts and in the Rivers of India,*" the author has shewn, with others, that the waters were as prolific as the land, and that a source of employment and of wealth might be rendered available by more extended attention to the catching and curing of Fish, as well as to the preparation of Isinglass.

It was also the author's intention to have published a summary of the Mineral resources of India, that he might have included, in our general view, the notices of the mineral substances which are available for the purposes of commerce and the arts in India, and which are scattered through a variety of publications. Many of these minerals he has, however, mentioned in his "*Essay on the Antiquity of Hindoo Medicine;*" where, from finding Indian drugs mentioned

and employed by Greek physicians, he argued that their properties must have been ascertained by the Hindoos before they could have been known to the Greeks. So from the mineral substances mentioned by the Arabs being all found in India, and some of them even mentioned by their Indian names, he inferred that chemistry originated with the Hindoos, and not with the Arabs, as is generally supposed.

The above task the author hopes yet to accomplish, as it has only been intermitted for the purpose of carrying out the present one. This he has been induced to undertake in consequence of the numerous inquiries made of him respecting substances fitted for the arts and manufactures of this country. Amongst these questions may be specified, first, whether the substance is procurable in India? secondly, in what part of that country it may be found, or perhaps grown? thirdly, by what name or names it should be inquired for? and, in addition to the price and peculiar properties of the substance, also whether it is equal or superior to some analogous substance procurable from other parts of the world?

If any one even well acquainted with India were asked what are the substances which the natives of India employ in the processes of dyeing or of tanning, or what are the plants which afford them substitutes for hemp or flax, or what are the trees which yield the various kinds of timber, he would find it difficult to give a satisfactory answer. The difficulty would be equally great if he were asked what are the names by which the several gums and resins, fatty or essential oils, may be obtained. If a merchant or manufacturer in this country, or even on the spot, wished to obtain these very substances for experiment, or for comparison with those already in use, he would find the difficulty sometimes so great as to be insurmountable.

The author is therefore of opinion, that if the several substances procurable in India were arranged with their Indian and English names, in some method by which they might be easily accessible to those interested in the different kinds of products, considerable facilities would be afforded to merchants, manufacturers, and the public. Also, that considerable increase might reasonably be anticipated in the demand for various products from India, which are now

obtained from other parts of the world. The only plan for such a work, sufficiently clear and simple to be consulted by those unacquainted with the names of new products, is that in which they are arranged according to their most prominent properties. An alphabetical enumeration presupposes a knowledge of names, for without this even familiar things cannot be recognized in foreign Price Currents much less can those which are new be known. On the other hand, a Natural History arrangement, which, though most satisfactory to those who are initiated, or who wish to pursue original investigations, is usually distasteful to practical men. Such like to refer to an index when they wish to obtain information respecting any thing of which they want to know the properties. But to do this they must first be acquainted with a name.

When substances are arranged according to their properties, nothing is easier than for any one to ascertain if India or any other foreign country contains any new kind of useful or ornamental product, which might be employed instead of, and be cheaper than that already in use. Thus among cordage plants, he might search for substitutes for hemp and flax. Among those which yield oil and fatty substances, he would find the means of supplying the wants of those, who cannot or will not go to the expense of employing a high-priced, animal oil. So among gums, resins, colouring matters, tanning substances, and others, the inquirer would be able easily to seek, either for a new and more efficient agent to answer his purposes, or to find a cheap substitute for what he already employs.

The method will, however, be more intelligible from an example than from description. In the first table is represented a general view of the heads under which all the different substances are to be treated, with a few examples of each. In the next table an example is given of the mode in which each separate class is proposed to be treated; a tabular view of the whole being first given, to be followed by a description of the nature and useful properties, value, abundance, &c. of each particular substance. In the tabular view, the English name is first given, and opposite to it the Indian ones, by which the substance may be procured in the different presidencies of India, these are followed by the natural history name by which the sub-

stance may be most accurately determined, and further information respecting it sought for, if need be, in scientific works.

In order to give a complete view of the capabilities of India, and afford a good basis for the scrutiny of the practical man and the criticism of the man of science, it will be desirable to premise the view of what India is capable of producing, with a succinct notice of what is already imported from other parts of the world, for the use of our various arts and manufactures. By thus affording the means of rigorous examination, the author hopes to satisfy even the most sceptical, that the statement with which he commenced will be fully borne out by an accumulation of facts.

Tabular View of the Order in which it is proposed to treat of the Useful Products of India.

TIMBER Trees—Teak, Saul, Sissoo, Toon, Ebony, Deodar, Chikrasee, Soondree, &c.

CORDAGE Plants—Flax, Jute, Sun, Sunnee, Hemp, &c.

Materials for Thatching—Osier plants, &c.

FECULA or **STARCH** Plants—Corn grasses, Arrow-root, Sago, Salep, Yam, Sweet Potatoes, &c.

SUGAR-yielding Plants—Sugar-cane, Wild Date, Palmyra, &c.

Fermented Liquors from do.—Rum, Mhowa, Palm wine, &c.

Manna from different plants—Toorunjbeen, Guzunjbeen, &c.

MUCILAGE-yielding Plants—Linseed, Quince-seed, Balungoo, Isufghol, &c.

JELLY-yielding Plants—Carounda, Mango, Guava, Hibiscus, &c.

GUMS procurable in India—*Babool*, *Keekur*, *Seriss*, Kuteera, &c.

RESINS procurable in India—Dammar, Copal, Olibanum, &c.

WOOD OILS and **LIQUID VARNISHES**—*Theetsee*, *Wood Oil*, *Piney*, &c.

CAOUTCHOUC, from Assam, Tennasserim, Penaug, Sincapore, &c.

ESSENTIAL or **VOLATILE OILS**—Attar of Roses, Oil of Sweet Calamus, Keora, Kayapootee, &c.

FATTY OILS—Poppy, Linseed, Cocoa-nut, Mustard, Rape, Apricot, &c.

Vegetable Butters—Fulwa of Almora, Butter of Canara, &c.

ALBUMEN, **GLUTEN**, &c.

ACID-yielding Plants—Lemon, Lime, Tamarind, Kaurukh, &c.

ALKALI-yielding Plants and Bases, &c.

DYEING Substances—Indigo, Turmeric, Muriel, Sappan-wood, &c.

TANNING Substances—Keckur, Babool, Catechu, Galls, &c.

AGRICULTURAL and HORTICULTURAL Plants—Wheat, Rice, &c.

ANIMAL Substances—Wool, Hides, Horn, &c.

MINERAL Substances, &c.

MEDICINAL Substances—Senna, Rhubarb, Opium, Colocynth, &c.

Plants yielding Oil in India.

English, &c Names.	Hinde Names.	Tamool Names	Mahratta	
Poppy, (1) ...	Post, ...	Cassacassa, ...	...	Papaver somniferum
Linseed, ...	Uisee, ...	Siroor sandal verri, ...	Jowas uisee, ...	Linum usitatissimum
Sesamum, } Gingelly, }	Suffed til, ...	Nul, ...	Gingelle, ...	Sesamum orientale
Castor, ...	Arundee, ...	Sitt amooraka, ...	Erundi, ...	Ricinus communis
Hemp, ...	Bhang, ...	Ganjah, ...	Bhang, Ganja, ...	Cannabis sativa.
Apricot, ...	Choochara, } Zurdaloo, }	...	Pistah, ...	Prunus Armeniaca
Almond, ...	Badam, ...	Vadamecottay, ...	Baddam, ...	Amygdalus communis.
Tobacco Seed, ...	Tambakoo, ...	...	...	Nicotiana Tabacum
Cucumber, ...	Kheera, ...	Vulleri verei, ...	Keera Kankurai, ...	Cucumis sativus, &c. & others of this tribe.
Ground Nut, ...	Moongphullee, ...	...	Velaiti Moong, Boi Moong, ...	Arachis hypogæa.
Physic Nut, ...	...	Caat amunaka, ...	...	Jatropha curcas.
Black til, ...	Kala til, ...	...	Ramtil, ...	Guizotia oleifera.
Croton, ...	Jumalgotta, ...	Nervalum, ...	Cadal avanacre, ...	Croton tiglium.
Cocoanut, ...	Naryul, ...	Taynga Tel. Cobri	Nariel, ...	Cocos nucifera.
Mahwa Seeds, ...	...	Caat eloopei, ...	Mowhra, ...	Bassia latifolia
Blupen Tree, ...	...	Eloopei, ...	...	— longifolia.
Calophyllum, ...	Surpunka, ...	Pinnay, ...	Poona, ...	Calophyllum mophyl- lum.
Bastard Saffron, ...	Kurrar, ...	Sendoorkum, ...	Koosumba, ...	Carthamus tinctorius.
Horseradish tree, ...	Sohunja, ...	Moorungy Kai, ...	...	Hyperanthera Morin.
Karunj, ...	Papree, ...	...	Karunj, ...	Pongamia gla'ra. [ga.
Mustard and Rape Seed, other varieties, ...	{ Itai, ... bunga surson, ... kalee surson, ... toria, ...	{ Kudaghoo,	{ Rie,	{ Sinapis ramosa Sinapis juncea. Sinapis dichotoma. Sinapis glauca.
Butter or Ghee Tree, ...	{ Fulwa or phul- wara, ...	{	{	{ ... Bassia butyracea.
Vegetable Tallow of Canara, ...	{	{ Peynie,	{	{ ... Vateria Indica.

PLANTS YIELDING OIL AND FATTY SUBSTANCES.

(1). Poppy oil, or oil of poppies, is obtained by expression from the seeds of the poppy which yields opium (*Papaver somniferum* of botanists), of which there is both a white and a red variety. The capsules of either are suited to yield opium, and the innumerable

seeds which they contain are equally fitted to yield oil. This fact the natives of India are well acquainted with, but the seeds are also eaten sprinkled in cakes and sweetmeats of different kinds. It may be a consideration, therefore, in many situations, whether it is more profitable to sell the entire seed, or to express the oil and retain the oilcake as food for cattle. It might be supposed that the seeds have some of the properties of opium, and therefore be objectionable as an article of diet for man, and the oilcake as food for cattle. This prejudice was absurdly entertained in France for many years: and was owing, French authors say, to the merchants who imported olive oil in large quantities, wishing to prevent the consumption of that of poppies. The magistrates consulted the Faculty of Medicine of Paris on this subject, and they decided "that this oil contained nothing narcotic nor hurtful to health, and that the use of it ought to be permitted." But this did not prevent the parliament from prohibiting the sale of the seeds, unless they had been previously flavoured with oil of turpentine. This was not abrogated until 1774, by the exertions of Rozier, the author of the *Dictionnaire d'Agriculture*. The poppy is now extensively cultivated in France on account of the seeds and oil, which form articles of commerce to the value of more than 25 millions of francs annually. The poppy is also cultivated in Holland for the same purpose, and especially the variety with darkish-coloured seeds. From Germany, the culture spread into Austrian Flanders, and from thence into the northern departments of France, where it is the principal oil employed. Also, in other countries on the Continent.

Remarks on the physical aspect, climate, and vegetation of Hong-Kong, China, by RICHARD BRINSLEY HINDS, *Surgeon, R. N.*

The island of Hong-Kong is one of several at the entrance of the Canton river, all of similar aspect, character, and population; the former wild, dreary, bleak, and apparently extremely barren; the last, by turns, fishermen and pirates. Hong-Kong is equally rugged with the others, and consists of several mountain masses thrown together, connected occasionally by ridges, and between these, lie nu-

merous vallies, more or less sheltered from the violence of the winds. The general appearance of all its parts is similar; but the easterly portions are bolder, the vegetation more sparing and stunted, the outlines more rounded, and the large bare masses of rocks unscreened by foliage. The western side is evidently preferable, as the vallies descend with less rapidity, and a certain quantity of soil is collected; vegetation thrives better, and is more varied; some stunted pines try to assume the importance of trees; and the shores bear no marks of the violence of the ocean. Water abounds everywhere, and each valley of the least pretensions, sends its stream to the cultivated grounds near the shore, where a portion is retained for irrigation, and the remainder is permitted to find its way to the sea. These streams continue to exist through all the seasons of the year, though they diminish greatly during the dry weather. After the rains, many become small torrents, tumbling in haste over their rocky beds, and sometimes forming little cascades.

Granite is the prevailing rock, and it abounds every where, having in many places been extensively quarried, and was largely used in the construction of the forts on the peninsula of Lantau. Though the usual structure of the granite be hard and resisting, yet where it has been much exposed to the action of moisture, its colour has changed; it is easily disintegrated by the fingers, and small masses of quartz separated. The sands of the beach have this origin, and vary in fineness according to the transporting influence of the water. Towards high water mark it is often as coarse as gravel, and thence gradually increases in fineness, towards the line of low water, till it becomes a fine sand. Basaltic trap is not uncommon, and on the rocks skirting the bay of Tcha-Tchu, I observed a vertical dyke of basalt, of about ten inches breadth, traversing the granite. In a small bay on the northern shore, I saw a quantity of pumice strewed near the beach, beyond the usual influence of the tides.

With so much irregularity of surface, there will necessarily, be much diversity in the soil; the mountain sides and elevated parts will be chiefly bare and rocky, whilst the beds of the vallies are likely to collect all the usual materials which contribute to its formation. In many places it is deep, and on examination, proves of a red colour, friable, containing small particles of quartz, and, it would appear, sufficiently productive; in some cases it approaches clay, and is made into bricks, which by burning take on them a blue colour. This is their general aspect throughout the vast surface of the empire, and

the character of the soil, clay, and bricks of Hong-Kong is a fac-simile of those of China generally.

To the vallies ~~then~~ is nearly restricted all the cultivation of the island. The selection is usually made where these terminate on the coast, the sides of the vallies here expanding, and the supply of water for irrigation being more abundant and regular. Still, the surface requires some artificial levelling, and the peasantry often distribute it into a series of broad terraces, from one to two feet above each other, and which, from a distance, resemble gigantic staircases. Great neatness is conspicuous in their formation; sometimes the sides are faced with stonework, though an earthy barrier usually suffices, and the outline is formed with much regularity. A healthy supply of water from the neighbouring stream is admitted by suitable channels, according to the necessities of the growing crop, and sometimes women pour water over the plants, individually, from large buckets of bamboo with long spouts. This they often practice in the middle of the day, when the sun is at its highest. The staple production of these terraces is the sweet potato, but yams and cocoas are also cultivated; turnips are evidently favourites, and it is rare to see an establishment without a corner devoted to a bed of onions. A few other vegetables may occasionally be met with. Fruits are apparently considered unworthy of the close attention of this thrifty population, and they are rarely to be seen; the Chinese have a bad opinion of trees in the vicinity of cultivation, and do not regard the fruit they yield as a sufficient compensation for their hurtful influence.

The vegetation of China is influenced by a climate with many peculiarities. For the latitude, the annual range of temperature is very great; and this is rendered more conspicuous by comparing it with other localities in a similar parallel, as the Philippines, San Blas in Mexico, and Calcutta. A series of observations made at Canton gives 70.4 as the mean temperature, which is below the average. The annual range is from 29° to 94°, and the daily range is also considerable. June, July and August are the hottest months, and their mean temperature is respectively 89°, 94°, and 90°; December, January and February are the coldest, and the mean is 57°.5, 51°, and 51°.5.

The condition of the climate with respect to humidity is as variable as that of temperature. The atmosphere, as a general rule, is usually saturated above the average of the latitude; but this is also liable to much fluctuation. The northerly winds will sometimes occasion excessive aridity; while the southerly winds of the spring months, on

the contrary, give rise to long-continued damp fog, and a close moist state of the atmosphere. Rain is registered in all the months, but the least in December and January, according to some protracted observations. The greatest amount falls in May and the four following months, the excess, according to an average of sixteen years, occurring in this month. These observations give an annual average fall of 70.6 inches, but it has been known to attain 90 inches. The great irregularity in the fall of rain is conspicuous on a comparison of the deposit in 1840 with the above. In this year, the amount was 61.1 inches, and September was considerably the wettest month, whilst December, which in the long average produces only nine-tenths of an inch, now had six inches. With such a state of deposit, the number of rainy days is probably very great, though I find no detail respecting them; and, as a consequence, the saturation of the atmosphere will be such as to bring the prevailing dew-point near the temperature.

Pursuing the circumstances of climate in connexion with the vegetation, it may be observed, that the absence of those tropical forms so usual in this latitude, or their occurrence in such sparing numbers as to make their absence still more remarkable, indicates some feature in the climate prejudicial to their existence. The cocoa-nut, which so often crowds the shores, and delights in the sea-breeze of the tropics, the rich luxuriant vegetation, particularly of ferns, is nowhere seen, and the tropical endogens are scarcely represented. In part, this may be attributed to the occasional dryness of the atmosphere, but more I think, is due to the great range of temperature, and to the extreme depression sometimes occurring. The seasons comprehend a summer with the warmth of the tropics, and a winter as cold and fickle as that of a high latitude, and embrace a temperature ranging through sixty-five degrees. Yet, though this may deprive China of a number of valuable fruits and vegetables growing in the same latitude elsewhere, it offers a very favourable opportunity for the study of the peculiarities of such as will thrive here. By many of its indigenous plants, as *Pinus*, *Rubus*, *Rhododendron*, and *Viola*, we are reminded of the sedate Flora of our northern countries. On the whole it is evident that the vegetation is not what is usual in the same latitude.

When our specimens were collected it was the winter or dry season, and vegetation was not in vigour or beauty. The distant view of Hong-Kong presented a picture of sameness and barrenness, not likely to convey a very favourable impression of the variety and interest of the vegetation. This, however, improved on a closer inspection. The valleys are the situations where the greatest diversity is found, the vegeta-

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tion here being sheltered from wind and nourished by the soil and streams. On the shoulders of the hills little is seen, beyond fern, stunted grass, and a few poor mean bushes. Trees can scarcely be said to exist; but there is a great variety, in sheltered situations of low pretty evergreen shrubs, and their prevalence is a leading feature in the vegetation. A large proportion bear berries of different colours, which render them attractive and ornamental. Some difference is easily perceptible between the plants of the elevated vallies and those lower down; a neat *Rhododendron* is almost confined to the greatest heights, and *Photinia serrulata*, though it abounds below, flowers more freely and prettily at an elevation. *Pinus*?—has here a very low range of latitude, as 22° N. E.; but grows only on the west side of the island, where, though without a stunted aspect, the trees are all small, low, slender and delicate. The general appearance of the vegetation decidedly indicates a dry climate, visible in the absence of great luxuriance, in the compact evergreen foliage, and the scarcity of cryptogamic plants, for I observed not a single moss or agaricine fungus.

The flora of China is remarkable for its assemblage of genera from various, and sometimes distant, sources; and in this respect is without a parallel in any other part of the world. Forms, distinctive of Indian vegetation, and of the warm moist Islands of the Malay Archipelago, are freely mingled with others from northern Asia, Europe, and even the eastern parts of North America.

The habit and character of its vegetation is such as it is usual to except at some distance to the north of its geographical position, and though an enumeration of the species would contain a large proportion very decidedly tropical, they fail to impart their peculiar features.—*London Journal of Botany*, Sept. 1842.

ON THE MANAGEMENT AND IMPROVEMENT OF MANURE.

[Management of Manure]

In the *management of farm-yard manure*, two primary objects present themselves: first, to prevent waste of every kind; and, secondly, to increase the quantity of dung by every means in the farmer's power. The waste is effected in the manner before alluded to, by unnecessary and excessive fermentation, by which the organic parts are dissipated in a gaseous form, and by suffeting water to run through the dung, by which the inorganic substances, the salts, are carried away in solution. No dung should be allowed to ferment until a few weeks before it is

put into the soil, and then only in that slight degree as to render it manageable, and to facilitate its decomposition when in the soil.

As the farm-yard is the general depôt for dung in the raw state, care should be taken to give it such a form as may best preserve it, as well as bring it to perfection; and on this there is a little difference of opinion: some theorists recommending them to be made so *concave* as almost to amount to a *well* shape, giving as a reason in support of their opinion,—“that the virtues of dung can only be preserved by its being saturated with urine or some other moisture;” while others assert that dung-yards should be formed *convex*, and assign as their reason, “that farm-yard dung should be kept dry.” Practical experience, however, points out,” as Blackie says, “that a medium between these two extremes is best.” In this we concur; and the form which we recommend is to slope the sides towards the centre: making either at the centre or the lower end, as may be found most convenient, a tank (which may be made at much less expence than farmers generally imagine) to receive the soakings of the dung, towards which the entire surface of the yard should have a gentle inclination for discharge. The bottom should be made of concrete powdered brown lime and gravel, in the proportion of 1 of the former to 6 of the latter, mixed wet, and deposited immediately, or Macadamized stone; or, should the yard be concave, an under-drain should be carried from its centre to communicate with the tank, which should, in that case, be made outside the buildings.

The water from the surrounding roofs should be conveyed away by shoots, or spouts from under the eaves, and no water from any source should be allowed to pass through the dung, except the rain water which falls directly upon it. Indeed, independently of the injury which the manure will sustain by being saturated with water, there is also the very material consideration of keeping the store-cattle which are kept in the yards as warm and as free from wet as possible. The *dry-litter* from the horse-stables, shaken from the dung, should, therefore, be spread constantly and regularly over it, as it will add much to their comfort. If, however, there be a drain and tank, the yard should not, in our opinion, be bedded with any kind of earth, but should have a foundation for the straw, laid with the trimmings of hedges, quickens the haulm of potatoes, or of those fibrous substances which are usually burned, as well as root-weeds, which should be collected from the farm, and mixed with a little quick-lime to insure their decomposition. In order to keep the cattle dry and comfortable, the dung from the stall-fed cattle and pig-sties, and every kind of rough

vegetable stuff or animal refuse, together with all the sweepings, soap-suds, and slops from the house, should be carried from the sheds to a compost formed outside the yard, and added in regular layers to the heap, intermixed with the dung of the horse; for if this be not done, the manure will be of unequal quality, and the crop, even in the same field, will often display great disparity.

We are all well aware, that according to the most approved modes of laying out farm-yards, they ought to be surrounded with buildings, which should be raised above the level of the yard, which should also be divided into compartments for cattle of different sorts and age, and every arrangement made in their construction for the saving of labour, and increase of convenience, and if an intelligent farmer had the means of providing his homestead, there can be little doubt that he would be well accommodated; but he must take his land as he finds it, encumbered, as it frequently is, with ill-arranged and ill-assorted tenements which he cannot alter, and respecting which we, therefore, deem it unnecessary to offer any observations.

It is a common custom to lay a quantity of loose earth of some kind over the yard, as a foundation for the bedding of the cattle when they are taken for the winter, for the purpose of absorbing their urine, and thus creating, or at least retaining, a valuable portion of manure, which might otherwise be lost; and this we admit to be a consideration of material importance, though counteracted in some degree by the cold and damp which it occasions to the stock. If peat can be procured within any reasonable distance during the summer time, it should be carted to the neighbourhood of the yard, and after laying spread to get tolerably dry, should be thrown up into heaps for occasional use during the winter, the yard being first covered with it as soon as the dung of the previous winter has been removed. The peat so laid up should occasionally be spread upon the surface of the dung; but in case it cannot be procured, a few hundred weight of gypsum should always be at hand to scatter over the dung from time to time, and also a small quantity of rough sea salt, or, if that cannot be had, common salt. A little of the gypsum should be also sprinkled every day upon the floors of the stables where the urine runs, which will be swept out and conveyed with the litter to the general dépôt in the yard.

From time to time, as the drainings of the manure accumulate in the tank, they should be pumped or conveyed back over the whole surface of the manure, so as to keep the body of the materials in a constant state of gentle moisture, as nothing is more prejudicial to its quality than allowing it to get alternately wet and dry: but the surface should be occasionally spread with dry litter. The whole should be kept firmly trodden down by cattle; a caution of course not needful where rough stock are kept in the yard, which is often the case. This

is exceedingly needful, to prevent the untimely fermentation of the dung. The use of the sea salt is obvious from what has been said of its composition, that of the gypsum to prevent the escape of the ammonia when the dung comes to be fermented, while the heat acts as an absorbent, and when fermented becomes a valuable manure. By pumping back the soakings the soluble salts are preserved, and the dung is kept moist.

Some farmers, of large holdings, improve upon this system, by placing the different species of manure in separate heaps, according to their different qualities and speed of fermentation: thus, for instance, the dung of horse-stables, as being of the richest and hottest nature except that of poultry, that of fatting pigs and stall-fed cattle, as well as that of sheep, when kept in fold-yards, and lastly, the stores of the straw-yard; and this certainly affords the great advantage of enabling the husbandman not only to employ those manures at his own discretion, for the use of particular crops at various seasons, but also to either retard or accelerate their fermentation, by an intermixture with each other at the season or purpose for which they are wanted. On small farms, it is, however, inconvenient; but if the plan prescribed above be adopted, the effect of the manure of a farm would be nearly twice as great as when all such means are neglected.

The dung-yard should be considered as a manufactory of manure, and corresponding skill and attention should be bestowed upon it, if the farmer be desirous of placing his *first of arts* upon an equal footing with others. When it is found necessary to cart the manure away, in order to forward the business of the season, previous to the commencement of the work, a quantity of peat, marle, soil, or road earth should be collected on the spot, intended to receive the dung. The *foundation of the heap* should be laid with such material about six or nine inches thick, according to the nature of the dung to be laid upon it, and it should be rather inclined to the centre, so as to retain as much as possible of the soakage of the heap; the sides should be kept upright, and the top level. At the conclusion of the carting the two ends should be brought up to the general level of the heap, and the whole surface, including the top, sides, and ends, should be well coated with the mould, or other material provided for the purpose. About three weeks or a month before the manure is required upon the land, the heap should be turned, the earth thoroughly mixed with the dung, and another layer or coating of earth placed against the sides and over the top of the heap, by which the whole will be kept moist, and the gases, produced by fermentation, prevented from escaping.

When the last accumulation of dung is carted out in the spring, for crops which are then in preparation, the cart should not be allowed to pass over the heap, but the dung should be lightly thrown upon a layer of earth, prepared to receive it; and when the heap is finished, it should

be encased and covered with the earth, as before directed. It is supposed, in this case, that the dung is carted about a month before it is wanted for the turnip sowing. At the end of that period the dung will be in a high state of fermentation, and when it is carted to the trenches of the field, the splitting plough should follow as fast as the dung is spread in the trenches, and by that means the dung covered while yet reeking, and the seed drill should immediately follow.

When farm-yard manure is carried out for the formation of dung-heaps, which are not intended for immediate use, it is the common practice of most farmers to have the carts drawn over the heap for the purpose of compressing it, so as to delay its fermentation; which, however, not only occasions considerable additional labour to the teams, but also causes the manure to be trodden into lumps by the pressure of the cart-wheels and the hoofs of the horses: thus rendering the decomposition of the heap so irregular as to cause that great disparity which may frequently be seen in the growth of crops which have been equally manured: the cause being attributed to the seed, or the land, or to anything but the real reason. We are quite aware of the expediency in many cases of protracting fermentation, and the consequent necessity of compressing the dung: but this should be done regularly, with equal weight on every layer of the heap, and if it cannot be effected by the treading of men, it can be still better performed by the roller, in the following manner:—

Make the heap rather less in breadth than your roller, and to each end of this fix a moveable non, with hooks for the traces of a horse. Two horses will thus draw the roller, the dung-heap being placed between them, and they may be yoked together by a common whipple-tree and bars. Each layer of the heap will thus be equally rolled, layer after layer, without being trodden upon; and, as the heap gets higher, the labour to the horses will be much lighter than if they had to drag a loaded cart over it: independently of which the advantages of thus equalizing the quality of the manure, and enabling the farmer to spread it without having to break the lumps, and to incorporate regularly with the land, must be apparent to every practical husbandman.

By such management the great waste which frequently occurs from excessive fermentation or neglect, would be prevented. By the careful mixture in the yard of the several materials the dung would be of uniform quality, and by the subsequent management, neither the ammonia nor the humus or decaying vegetable matter would be materially diminished by such cautious fermentation, nor could the soluble salts be washed away, and thus nearly the whole power of the manure would be given to the crop with such addition as the care and diligence of the farmer provides in the shape of peat, ditch scourgings, slops, and refuse of every kind, gypsum and salt. The two latter are

most valuable materials when mixed in such proportion as to afford about one hundred weight of each per acre of the land dressed with the manure.

It is well worth consideration whether the foregoing method of management might not be much improved upon by subjecting the manure to less exposure to the weather, by making the great depôt in a pit under cover, and afterwards by limiting still further the degree of fermentation. The late Earl of Leicester found, that by using his manure much fresher than he had previously done, he obtained quite as heavy crops upon a much larger breadth of land. Little doubt can exist, that if the straw could be cheaply divided, so as to supersede the necessity of breaking it down by decay, a very slight degree of fermentation would suffice, and thus ammonia and sulphurous and carbonic gases would be prevented from escaping at all, or at least the loss of them would be still further diminished.

That so little care and well-directed skill has hitherto been manifested in the management of farm-yard dung in this country, can be no reason for continuing neglect. The success of a father or grandfather is far from being a proof that their practice in many respects cannot be improved upon, though that kind of argument is sometimes advanced. Their success should rather be attributed to their industry and skill, in the exercise of which they availed themselves of the best lights their time afforded them, than to blindly treading in the footsteps of their predecessors. If unreflecting prescription had been the rule, what would agriculture be at this day? In the great majority of instances the vast loss that has hitherto occurred in neglecting the management of manure must be attributed to the farmer not knowing the nature of the essential substances of which it is composed, and that the most valuable parts could escape as an invisible gas, or flow away dissolved in water. When his liability to loss in this way comes to be fully appreciated, and he becomes aware of the extent to which it is incurred in the ordinary and negligent methods of treating dung, a better system will be adopted, and no pains will be spared to preserve such invaluable materials.

That even the most enlightened and intelligent of practical farmers have yet very much to learn on the subject of manures is abundantly testified by the confusion of opinion which generally prevails on the application of certain individual salts, and the wonder often expressed of their success in one instance and their failure in another, in cases where the soil appeared to be the same. Nature is our great guide and instructor in these matters, and if we inquire of her, she will give us true and most valuable answers. Liebig has beautifully observed, "that experiments are questions put to nature, and the results of those experiments are her answers." The chemist has put such questions to nature respecting the composition of plants and their seeds, and she has

answered him "that they are formed of certain bases called by him earths and alkalis, united with certain acids, and of certain gaseous substances, the nature of which earths, alkalis, acids, and gaseous matters, she had previously explained to him."

The same question has been put respecting the composition of the dung and urine of the animals, which have been fed upon plants and their seeds, and the answer has been, what might have been expected, "that they consist of precisely the same substances, only in an altered form." The chemist naturally inferred that these substances are the food of plants, and that they cannot exist without them; nay more—that if *all* of them are not present the plant cannot be formed, any more than a house can be formed without timber, though all the other materials are at hand in abundance. But the farmer has not listened to his lore, and would none of his counsel. Without knowing of what his plants are formed—that many different substances are required for their nourishment, and that the presence of all those substances is requisite to the *fulfilment of the condition of their growth*—he applies one substance only, an individual salt; and if it *happens* to be the very substance that was wanted to fulfil the conditions of fertility, he gets a crop. Encouraged by this success the same salt is applied to another field with the full confidence that it will produce a similar effect. In this instance, however, to the great surprise and disappointment of the farmer, it proves an entire failure. Induced by the success of the first application, other persons try the same salt, some with entire success, others with partial benefit; but the greater number generally without any perceptible advantage. Further experience of this kind plainly proves that there is no dependence to be placed upon this particular salt, and it is ultimately abandoned. Such has been the fate of several different salts in succession, and thus common salt, gypsum, carbonate of soda, nitrate of soda, and nitrate of potash, have each had their periods of favour and disrepute. A few successful experiments with a particular salt have led to an extensive application of it, and to consequent great loss and disappointment.

Neither plants nor animals can live unless their food contains all the elements of which their substance consists. If a dog be fed upon flesh it will enjoy vigorous health, but if jelly alone be given it for food, which constitutes only a part of the flesh, it soon dies with all the appearance of starvation. Again, it will live and do well when fed with undressed wheat flour, but rapidly declines if kept upon fine flour from which all the bran has been taken. When the farmer applies farm-yard dung to his plants, it is like giving flesh to a dog; he administers all that the plants want to insure their growth; but when he applies a single salt, it is like giving only jelly or fine flour to the dog: at all events he throws himself upon the chance and uncertainty of all the other salts or substances which plants require for their food being

already in the soil. No wonder, therefore, that such empirical practice should so frequently fail.

When the farmer stands in need of a substitute for his own proper manure—farm-yard dung—as he cannot with certainty tell what is in the land, he should obtain one that contains, if not all the substances contained in that dung, at least those which are most likely to be deficient; and these in ninety-nine cases in a hundred will be *nitrogen in the form of salts of ammonia, phosphate of lime, and magnesia (bone earth), and potash.*

Night-soil with urine contains all of them, but the two first in greatest quantity, and wood and peat ashes yield potash, but the former in the greatest abundance. Many soils contain sulphate of lime (*gypsum*), and most soils have a sufficiency of common salt (*muriate of soda*), particularly in places near the sea; and it is on this account that they often fail, when separately applied as manures to produce any effect: their failure is the answer of nature to the experimental inquiry of the farmer—that such are not the substances wanted in the soil. Oxide of iron, magnesia, *carbonate of lime*, silica, and alumina, as they constitute the bulk of all soils, or neither of them scarcely ever so deficient as to be wanting for the mere food of plants. With the exception of oxide of iron and magnesia, their chief value depends upon their mechanical properties, in giving a due consistence to the soil, for the admission of air, and the retention of moisture.

Before concluding these observations it should be noticed, in confirmation of the views above taken of the application, or rather the substitution, of single substances for farm-yard manure, that even bones and substances abounding in ammonia often deceive the expectation of the farmer. The former have lately failed extensively on the estates of the Duke of Norfolk, owing, most probably, to that manure having been used frequently for a long time back, till the land had abundance of it, while other substances had been exhausted. It was used till the land had, to use a common expression, “become sick of it,” which indeed really means—that the land wanted no more of it, but was deficient of some other substance, perhaps potash, or salts of ammonia. Professor Liebig mentions an instance of a similar failure of a vineyard from the exclusive use of horn shavings, which is generally known to be a very powerful manure. The vines grew with great luxuriance, and bore plentifully for a few years, and then suddenly and entirely failed, probably owing to the complete exhaustion of the potash of the soil. Had wood ashes been mixed with the horn shavings, there can be very little doubt but the vines would have continued in full bearing.—*Faulkner's Practical Treatise on the nature and value of Manures.*

Monthly Proceedings of the Society.

(Wednesday, the 8th of Nov. 1843.)

The Honorable Sir J. P. Grant, President, in the Chair.

Members elected.

The gentlemen proposed at the last meeting were duly elected members of the Society, viz.

Messrs. E. Jenkins, R. P. Sage, T. G. Loch, A. Wallace, C. R. Jennings, and E. Boyle, Lieut. H. Rigby and Capt. G. B. Reddie.

For election.

The names of the following gentlemen were submitted as candidates for election.—

G. R. Gordon, Esq. Moulmein, proposed by Mr. D. C. Mackey, seconded by Mr. Joseph Willis. Charles Chapman, Esq. Civil Service, proposed by Mr. Wm. St. Quintin, seconded by Mr. C. E. Ravenshaw. T. B. Swinhoe Esq. Calcutta, proposed by Mr. M. S. Staunton seconded by Mr. Hufnagle.

Presentations to the Library.

1. Report of the Bombay Chamber of Commerce for the Fourth Quarter of 1842-43. *Presented by the Chamber.*

2. Calcutta Journal of Natural History &c; No 15. *Presented by Dr McClelland.*

3. The India Review and Journal of Foreign Science and the Arts. No. VI. of vol. 1. *Presented by the Proprietor.*

4. The Calcutta Literary Gleaner, Nos. 8 and 9 of vol. 2. *Presented by the Proprietor.*

5. The India Journal of Medical and Physical Science, No. 10 of vol 1. *Presented by the Proprietor.*

Museum.

1.—Twenty barrels of acclimated Upland Georgia cotton seed, and twenty barrels of acclimated Sea Island cotton seed, the produce of the Government Cotton Farms at Coimbatore. *Presented by the Government of Madras, on the recommendation of Dr. Wight.*

The Secretary mentioned that this seed, which had been sent from Madras by the Steamer "Hindustan," had arrived in very good order. The best thanks of the Society were directed to be offered to the Madras Government for the acceptable contribution.

2.—Eleven samples of wheat and other grains from Hooshungabad. No 1, is best wheat called 'Julalya,' No. 2, is a second best wheat

called 'Kutya;' No. 3, 4 & 5 are also wheat, named 'Satya,' 'Sohalya' and 'Pissee;' No. 6, is the common Chenna, (Boot grain); No. 7, 'Parbuttya,' or white gram; No. 8, white linseed; No. 9 & 10 white and black til; and No. 11, is the 'Mughy T.L.'—*Presented by Lieut. Col. J. R. Ouseley.*

The Secretary informed the Members, that on a former occasion, namely, at the meeting in September 1839, some samples of the same varieties of wheat, gram and til, were presented by Colonel Ouseley and that at the following meeting in October, the Agricultural Committee to whom the grains were referred, gave in a very favorable report on them. The wheat in particular was pronounced "superior to any the members had before seen in this country, both kinds (the Julalya and Kutya) weighed full sixty pounds to the bushel." The white til was also stated to be very good.

It was proposed by the President, and unanimously resolved, that the best thanks of the Society be given to Col. Ouseley for these samples. Further, that they be referred to the same Members who reported on the former samples, with a view to determine if any improvement or deterioration has taken place during the last four years.

Sample of fibre from the Burdwan District.—*Presented by Mr. John Cowie, on behalf of Mr. T. J. Atkinson*

The following is extract of Mr. Atkinson's letter on the subject —

"I send you the enclosed, which has been extracted from the leaf of a plant in my garden. I do not know the name of the plant, but it slightly resembles what the natives call "Moograh" or "Ronga," from the leaves of which they also extract fibres from which ropes are made. I send a *small* sample of that also, but you will observe, that the fibres are much coarser, and not nearly so strong as the other. Could you kindly get a report on this sample, or I could send a larger quantity if required. If found serviceable, it could be manufactured much cheaper than Hemp."

The Secretary was requested to procure a leaf, flower, and seed of the plant which afford these fibres. The samples were referred to the Hemp and Flax Committee for report.

Nursery Garden—Cane distribution.

A report of the proceedings of the Garden Committee was read.—The Committee recommends, in consequence of but few applications for cane having been received, to reduce the charge to one-half the former rate; viz. to three rupees two annas for one hundred canes, with a view to dispose off the large stock in the garden as soon as possible. The Committee further suggests, that as there is a large quantity of young vegetable plants in the garden, much more than will be required for the purpose of seed, that they be advertised for distribution to Members of the Society. The Committee has agreed to extend

the cultivation of the guinea grass, in order to meet the constant demands for roots and seed.

It was proposed by Mr. Staunton, seconded by Mr. Storm, and resolved,—That the Report of the Garden Committee be confirmed, and that former applicants for cane be entitled to receive their supplies at the reduced rate.

Horticultural Exhibition.

A list of native gardeners to whom prizes to the amount of 180 Rs. were awarded at the Quarterly Show, held on the 28th of October, was next submitted. The Remarks appended to the list mention that the Show was a tolerably good one, considering it was held so early in the season; that there were some very good specimens of lettuce, carrot, celery, asparagus, turnip, and radish with several baskets of Tenasserim yam and Assam bean. Among the Fruits, sapotas, papiahs, pomegranates, custard apples, and pumplenose were all of a superior description, there were also a few baskets of oranges, grown in the neighbourhood of Calcutta. The Report adds, that altogether the Show may be considered a satisfactory commencement of the change from an annual to quarterly exhibitions.

Indian Wheat Question.

The Secretary intimated that in accordance with the resolution passed at the last meeting, he had circulated to the members of the Wheat Committee the papers which had been received in reply to the Committee's circular. The members he would beg to state, are almost unanimous in opinion, that the information on hand is not sufficient to admit of the carrying into immediate effect, the suggestion contained in Mr. Speede's memorandum which was submitted at the last meeting, and that it would be better, to wait for a short time in the hope that further information may be obtained. That in the meantime a second application be made to those gentlemen, who have not yet replied to the call of the Committee, requesting the favor of their speedy co-operation. The Secretary was directed to act as soon as possible upon this recommendation of the Committee.

The following are the points on which information is required. They are re-published for the sake of a readier reference, and in the hope that other parties than those who have been addressed, may be induced to give the Society the benefit of their practical experience:—

1st. On what description of land is wheat grown in the districts you are acquainted with?

2nd. What rent does the ryott pay per biggah, and what is the size of the biggah in square yards?

3rd. What is the cost of cultivating wheat land, including seed and rent?

4th. Is such land irrigated, and if so, how often during the growth?
 5th. When is it sown and reaped, and what the extent of crop in Calcutta bazar maunds?

6th. Are other crops sown with it, and what are they?

7th. At what rate per Calcutta maund could good wheat from your district be landed in Calcutta?

8th. How many descriptions of wheat are grown in the districts with which you are acquainted, and what are their respective qualities?

9th. Can you favor the Society with small samples of each description procurable?

The Secretary stated, that in connection with the subject under discussion, he had the pleasure to read a note he had just received from Dr. Strong, suggesting that the Society should have the wheats from different provinces analyzed, with a view to determine the proportions of nutritious matter contained in each variety. Dr. Strong quotes a remark of Sir H. Davy, that Tropical wheats abound more in gluten than those produced in colder countries, and he supposes this to be the cause of their being so nutritious. "Even in Europe," adds Dr. Strong, "the southern produce is said to be superior to others, in consequence of the larger quantity of gluten it contains. Should it be proved that Indian wheat is much more nutritious than European, it is an additional argument in favor of transportation from this country."

Dr. Strong's communication was referred to the Wheat Committee.

Formation of a Branch Agri-Horticultural Society at Moulmein.

A communication from Mr. G. R. Gordon, announcing the formation of an Agri-Horticultural Society at Moulmein, of which he has been appointed Secretary, was next read. Mr. Gordon states, that the first meeting was held on the 2d October, when a Committee was formed provisionally to make rules, &c.; and that he has been desired by the Committee to open a communication with the Parent Society. Mr. Gordon adds, that he will furnish full particulars of their proceedings by the next opportunity.

Resolved,—That the Moulmein Society be included in the list of Branch Societies, and that every assistance be afforded it.

The Esculent Roots of Central Africa.

The Secretary stated, that having observed in a late number of the *Friend of India*, an extract of a letter from a missionary, resident at Lattakoo in Central Africa, regarding some esculent roots of a superior description, which abound in the deserts of that country, he had put himself in communication with Mr. Marshman, who had obligingly furnished him with further particulars on the subject. He would beg to read to the Members the following short extract from the letter in question, as perhaps they might think it desirable to endeavour to obtain some of the roots alluded to:—

"I saw somewhere a notice from an Indian paper regarding the formation of a Society, if I mistake not, under the patronage of Lord Auckland, for the purpose of ameliorating the condition of the natives of India by introducing esculent roots, &c. from other countries. It struck me, that the roots and fruits which abound in our deserts beyond this, would be excellent for India. We have on the desert, where there is not a drop of water for a great part of the year, no fewer than 32 roots and 43 fruits. Some of them are excellent, and form the chief food of the Bushmen and other natives of the desert. They grow on the sand without any cultivation, and if cultivated, they very probably would be improved. One root is excellent, when young, resembling a young turnip, and it produces a bean about the size of a marble, which when roasted, is very pleasant—you see only a few pods containing the beans, but if you dig down a good way, you may get a root as large as your thigh, and this too in the most desert places. There are several pleasant fruits too, which might be much improved by cultivation; even now the flavour is excellent."

It was resolved, that the Secretary do forward a copy of these papers to Dr. Wallich, at Cape Town, with a request that he would endeavor to assist the Society in procuring the roots referred to in the above communication.

Applications for Seeds.

1. Read a letter from C. Beadon, Esq., enclosing a communication from Mr. J. O. Price, Government Cotton planter at Dacca, requesting to be favored with a supply of Cotton seed for trial in different parts of that District.

2. From C. Delegal, Esq., Secretary of the Agricultural Society of Ceylon,—asking for a large supply of Cape vegetable seeds, for the use of the Members of their Society.

3. From Captain F. N. Reid, Secretary of the Agricultural Society of Madras, requesting to be furnished with Flax and Sissoo seed for distribution at that Presidency, and in its vicinity.

The Secretary mentioned, that all these seeds had been furnished, with the exception of the Sissoo, which will not be fit for gathering before January, when Dr. Griffith has kindly promised to give a supply from the Botanic Garden.

A letter was also read from John Stikeman, Esq., Secretary of the E. I. and China Association, returning thanks for a copy of the English volume of the Transactions of the Society.

For all the foregoing letters and presents, the thanks of the Society were accorded.

Correspondence and Selections.

COTTON CULTURE AT CEYLON.

Extract of a letter from the Hon'ble T. H. MADDOCK, Esq.

If the Cotton Committee of the Agricultural Society would favor me with an opinion of the quality and value of the accompanying specimens of Cotton from Ceylon, I shall be much obliged to you to request them to do so.

Remarks by JOSEPH WILLIS, Esq. on the above Samples of Ceylon-grown Cotton.

1. Sample of Cotton from Bourbon seed, the produce of "Masar" Estate, Jaffna, 1843

Staple, of good length and strength, though rather irregular in its length, rather more curly than the generality of Bourbons, still a good staple, soft and silky.

Color, very good and healthy.

Value, from $5\frac{1}{2}d.$ to $6d.$ per lb.

If it crops well, it ought to pay well, being in quality a decidedly satisfactory cotton.

2. Sample of Cotton from New Orleans seed, received from the Agricultural Society, Calcutta, the produce of "Masar" Estate, Jaffna, 1843.

Staple, of regular length, rather short, very curly, fine and weak.

Color, excellent.

Value, from $3d.$ to $3\frac{1}{2}d.$ per lb.

The first view of this specimen is favorable, but a close re-examination proves, that it is deficient in stamina and strength; consequently it cannot be considered a satisfactory Cotton.

From a comparison of these two Cottons. the one being good and satisfactory, the other the contrary, it would appear that the soil and

climate of Jaffna is well adapted for the culture of the Bourbon, while it is inimical to the growth of the American plant. The result of the examination of these samples will be found to be much the same as that of the Bourbon and Upland Georgia Cottons, grown at Jaffna, which were presented to the Society by Mr. C. K. Robison, at a general meeting held on the 14th December 1842.*

N. B.—The estimate of the values given to these samples are founded on the Liverpool market prices of the spring of 1843, which are about $\frac{1}{4}$ d. per lb less than those of the spring of 1842.

Remarks by JOSEPH WILLIS, ESQ. on samples of Ceylon-grown Cotton, submitted to the Agricultural Society of India, by C. K. ROBISON, ESQ. at the General Meeting of the 14th December 1842.

No. 1. Sample of Cotton grown from Upland Georgia seed at Jaffna, 1842.

Staple, rather short for Upland Cotton, fine, rather weak and curly, and a little irregular.

Color, tolerably good.

Value, barely 4d. per lb.

No. 2. Sample of Cotton grown from Bourbon seed at Jaffna, 1842.

Staple, of good length, good strength and fineness, a little curly, and more irregular than the generality of Salem-grown Bourbons.

Color, good, a *slight* discoloration.

Value, about $5\frac{1}{2}$ d. to 6d. or lb.

This may be considered a decidedly good cotton, the soil at Jaffna appears to be more congenial to the growth of the Bourbon than the Upland Georgia plant. If this Cotton crops well, its culture will repay. It is an encouraging production.

No. 3. Sample of Cotton grown from Tinnevely seed at Jaffna, 1842.

* The report on these samples was inadvertently omitted to be published in an early number of this volume. It is now inserted for the sake of reference.

Staple, short, curly and coarse

Color and condition, pretty fair.

Value, $3\frac{1}{2}d.$ to $3\frac{3}{4}d.$ per lb.

No. 4. Sample of Cotton grown from Sea-Island seed at Colombo.

Staple, very strong, very long and silky.

Color, stained and somewhat imperfectly gathered, probably at an unfavorable time.

Value, $10d.$ to $12d.$ per lb. Had the color been good, the value would be $2d.$ more, viz. from $12d.$ to $14d.$

This at first sight is not a striking specimen, but a closer examination proves its goodness.

No. 5. Sample of Cotton grown about 20 miles from Jaffna, as an experiment, (seed not known.) It is about to be cultivated largely, was considered a prolific crop

Staple, of good length, strength, and fineness silky.

Color, very good.

Value, same as Bourbon, from $5\frac{1}{2}d.$ to $6d.$ per lb

This Cotton, in its general character, is not unlike Bourbon. As it is said to be prolific, it may be considered a very satisfactory Cotton, and in every way worthy of extended culture.

Memo.—The estimates of the values given to these samples are founded on the Liverpool market prices of the spring of 1842.

N. B.—All these samples are a little too curly

Progress of the Branch Agri-Horticultural Society of Bhaugulpore.

Communicated in the following letters from Major T. E. A. NAPLETON, Secretary of the Society.

There is one more point of much importance to this Society which I must not omit to bring forward on the present occasion.

To render our Agricultural department more generally useful to the neighbouring districts, grain of all kinds must be grown, imported, and distributed. At present our crops are beautiful, of white gram. Darjeeling barley, New Orleans and Seychelles cotton, Bhilsa, Cuba and Havannah tobacco, Darjeeling and four other sorts of potatoes, Cabool coriander seed, and English and Cabool clover

Thus far success has attended us in our first sowings, which is very encouraging ; and I can assure you, there is not a yard of ground in the Public Garden uncultivated. Hence, the demand for an extension of our garden. There are about 50 bigahs more of ground for sale adjoining the Public Garden, and if even half that quantity could be joined to it, there would be a large field for Agriculture in most of its useful branches.

Wheat from the southward of India, would be a boon, Oats from England equally so ; and a few bags of English potatoes sent out, so as to reach us in September, would be most acceptable.

The potatoe seed distributed in this district since September last, has been of the greatest benefit. You will see by the memorandum on this head in the show paper.

I have the honor now, in the name of the Society, to return the sincere acknowledgments of this Institution for the kind expressions and wishes conveyed in your letter of the 16th Dec. : and further to proffer our grateful thanks for the vote of English fruit trees and tulip bulbs, (the latter arrived from Dr. Griffith this morning in excellent order,) passed by the Society.

1st January. 1844

Bhauglepore Branch Agricultural, Horticultural and Floricultural Society.

The second show of the present season took place at 3 o'clock p. m. this evening in the Public Garden, and was most numerously attended. Thirty tables were laid out under the tamarind trees, upon which were displayed various specimens of Floriculture and Horticulture ; the exhibition of vegetables could not be surpassed in any part of India for this season of the year.

The vegetable marrow, imperial peas, cauliflower, Windsor beans, endive, Caubul capsicums, beet root, early cabbage, potatoes (Cherra Poonjee and Darjeeling), artichokes, scarlet runners, and celery, were all to be seen in the greatest perfection. Some English and Caubul clover of the finest growth were exhibited.

In the Floricultural department there was not much competition, there being only two or three gardens at the station which contain many rare specimens of the beauties of Flora ; and it has been de-

cided in consequence, that fewer prizes for some months shall be given in this department, in order to encourage the residents of the place to improve and more extensively cultivate this branch of the science : and it is hoped, a taste for Floriculture will induce many to exert themselves to come forward and produce rare specimens in May next. Cuttings of all rare flower plants and shrubs will be ready for distribution in the Public Garden, together with exotics, on the 1st of February next.

Prizes to the amount of fifty Rupees were awarded in the vegetable and flower departments.

A basket of potatoes grown from Cherra Poonjee seed by G. F. Brown, Esq. elicited much attention. The size and healthy appearance could not be surpassed any where at this season of the year. We were happy to observe a great improvement in the *dalis* of the native gentlemen and cultivators. Potatoes, cauliflowers, carrots, and many other English vegetables were to be seen in great perfection.

Since our last Report, we have received the following handsome Donations, and cannot feel sufficiently thankful for the continued support this Society is constantly receiving :—

From Major General Cartwright,	Rs. 30
His Excellency Major General Sir G. Pollock,	
G. C. B.	33
W. S. Kelly, Esq. of the firm of Owen, Alhusen	
and Co. Calcutta,	16
Charles Edward Davies, Esq. of Lattypore,	20
Total Rs.	99

We have also great pleasure in announcing the following additional Monthly Subscribers to our Branch Society :—

Lieutenant H. C. James, 32d Regiment N. I.

T. Grant, Esq. of Narrainpore.

H. Richards, Esq. of Nurdah.

Charles Edmond Davies, Esq. of Lattypore.

Captain A. Lewis, 32nd Regiment N. I.

This opportunity is taken to acknowledge, with very best thanks, the following Donations of plants, seeds, &c. from Non-Subscribers.

A boat load of flower plants, exotics and beautiful flowering shrubs, from Dr. Griffith, Superintendent Hon'ble Company's Botanical Garden. The plants were so well packed and secured, that only twelve out of three hundred and thirty, died, notwithstanding they travelled some three hundred and sixty miles in a country boat. This speaks volumes for the attention paid at the Hon'ble Company's Garden.

Likewise from the same gentleman, a packet of Darjeeling barley, which is now well above ground, and in a most flourishing condition.

Likewise from the same gentleman, a packet of coffee seed, in fine order.

Likewise from the same gentleman, two packets of tulip bulbs, sent from the Parent Society.

Nothing could be fresher, or more satisfactory than the state in which these bulbs arrived, and they were planted four hours after they reached this.

A packet of English clover seed, from Dwarkanauth Tagore, Esq. The plant from the above is now four feet high, and in blossom.

An assortment of very beautiful flowering shrubs and plants from G. W. Bartlett, Esq. of the Judicial and Revenue Department, Calcutta

From the same gentleman, a large supply of rare and fresh seeds from his own garden.

Mr. G. W. Bartlett being a florist of great experience, has been enabled to give the Secretary of this Institution very great assistance and information from the commencement of our proceedings, all which is duly appreciated.

From Dr. Campbell, Superintendent, Darjeeling, the following useful and acceptable donations have come to hand :

A small bag of Darjeeling barley, the whole of which is well above ground, and in a most flourishing state.

A basket of Darjeeling potatoes of enormous size and excellent flavour ; each potatoe was cut into ten or twelve pieces and planted, and has come up most freely,

• From A. Lambe, Esq, of Arungabad, a fine batch of coffee seed in very fine order.

From Dr. Pearson, a lot of beautiful exotics and other plants, from the Right Hon'ble the Governor General's garden at Barrackpore, but owing to a very long voyage, (six weeks,) many died; those alive however are much prized, and must prove very ornamental.

Extra donation from Capt. E. P. Nisbet, Commander of the ship *Agincourt*.

A beautiful geranium, and also a myrtle plant brought from England in excellent order, for which the best thanks of the Society are accorded.

T. E. A. NAPLETON,

December, 1843.

Secretary.

MEMORANDUM

By way of seeing how our crop of Furruckabad potatoes was progressing in the Public Garden, one root was dug up, and the produce was one hundred and three potatoes.

This is rather a late crop, and the potatoes were small; but in a month or six weeks, we may look forward to a magnificent crop.

Our Cabool melon plants are very healthy. I sowed the seed in trenches of sand with inches of mould above the sand. Very little water is required. If we rear fruit, we shall send some down to the Parent Society.

Our celery this year is magnificent; I never saw any thing finer in England. The seed which we sow in October, gives plants for the following year, and the rainy season does not hurt them. Plant out on the 16th of October. The seed of the fine celery was gathered from my own garden; and I have marked off several superb plants for seed this year.

ASPARAGUS.

The crops in my own and the Public Garden are from seed of this year, and most luxuriant in growth.

There is one garden here famous for asparagus, and always carries off the prizes, and I will make interest with the owner to procure a supply of seed for you.

I have reared about 20,000 plants of Savoy cabbage, broccoli, Siberian kale, Brussels sprouts, late cauliflower, and other things.

for late crops from the seed sent by Vetch and Sons from Exeter. The Swedish and other turnips also have succeeded admirably. Also lettuce of sorts, beef root, &c. &c.; and we have ten plants of sea-kale well above ground. Can you give me a hint as to the management of this splendid vegetable?—[See *Speede's Indian Hand Book of Gardening*, page 163.]

I have reared 15 geraniums from overland seed. Polyanthus, many plants. Sweet William, plenty. Tulips, nasturtians and wall-flowers in profusion. Stocks in abundance. Our Flower Garden is beginning to look very well; and next month, when the weather is a little warmer, all backward plants will begin to show themselves. I hope I shall not tire you with this long Memorandum. But it is written with a good intention, and if it proves in the least degree useful, I shall be more than satisfied. I have reared several hundred plants of asparagus from seed received from Vetch and Sons. I have just received a barrel of seeds from them, and there are 8 ounces of asparagus seed. If sown now, it will be above ground in three weeks. I will dispatch 4 ounces by dak bhangy to-day.* Sow on high ground, so that the rains will not injure the plant; plant out into beds 1st of October next. Soak the seed in cold water 24 hours before sowing. Water every five days or so afterwards.

21st January, 1844.

Bhauglepore, 22d February, 1844.

I have now the honor to acknowledge the receipt of your letter, dated the 17th January, 1844, and 2nd of February, 1844. In reply to the first, I have very great pleasure in reporting, that the two glazed cases of English fruit trees were delivered by Captain Templeton, of the Steamer *Berhampootee*, in *excellent order*. All the trees are alive and *thriving*, and we cannot sufficiently thank the Parent Society for these valuable acquisitions to our Public Garden.

In reply to your second communication, advising me of the intended dispatch, on the 12th instant, of a box of seeds, (contents fully enumerated and described,) by a Steamer, I am requested to

* This supply has come to hand, and been sown in the Society's garden.

state, that they will all be most acceptable to, and much prized by this Institution.

The *one seed* of Queen Ann's pocket melon duly came to hand, and you shall be duly apprized of the result of the experimental cultivation of it here. I am much obliged to you for the extract from Speede's India Hand Book of Gardening, touching the management of the sea-kale plant.

I have much pleasure in sending you an account of our last show, which we hope will meet the approval of the Parent Society.

Bhaugulpore Branch Agri-Horti. and Floricultural Society.

The third show of the season took place in the Public Garden at 4 o'clock on the evening of the 3rd instant, and was most numerously attended by the European and Native supporters of this institution; the ladies of the station and several visitors honored the exhibition with their presence.

The display of vegetables was unusually good. The produce of the Public Garden surpassed in size and goodness every thing brought to the show rooms. Potatoes from Darjeeling seed, imperial and marrow-fat peas, celery, carrots, turnips, Windsor beans, capsicums, *cum multis aliis*, were first rate of their respective kinds. The Public Garden specimens, however, are not allowed to contend for prizes, and that circumstance will account for none being awarded to it in the accompanying list.

Two cauliflowers from Cleveland House Garden were allowed to be the finest ever seen in India. The color beautifully white, the heart very compact. One of these measured $3\frac{1}{2}$ feet in circumference, when cooked, these were found to be perfect in flavour.

Some Darjeeling potatoes from the garden of C. Stuart, Esq. A basket of peas from the garden of G. F. Brown, Esq., Beet root from the gardens of Mr. Latour and Major Napleton. Some Battersea and sugar-loaf cabbage, and a basket of artichokes from Cleveland House Garden. Some nohl kohl from the garden of J. Glass, Esq. attracted much attention. It was gratifying to observe the great improvement in the *dalis* of the native subscribers. Instead of the poor specimens of indigenous vegetables they were accustomed for some time to bring, almost every *dali* contained good samples of English vegetables, and very superior indigenous ones. Altogether,

the show was a most satisfactory one. Twenty-two large tables were quite crowded with Horticultural specimens.

In the Floricultural department, there was but little competition, though the show of flowers was very good: Violets, narcissus, heliotrope in great abundance, dahlias, roses of five sorts, dianthus, sweet briar, lupins, geraniums, euphorbias, *cum multis aliis*, were to be seen amongst the bouquets.

In the Public Garden are to be seen some very promising plants of carnation, primrose, polyanthus, sweet william, ice plants, and a great number of double stocks in full blossom, as well as violets, and many other things.

This opportunity is taken for according the best thanks of the Society for the following most acceptable donations :—

From the Parent Society.

Two cases of English fruit trees, containing 1 black Hambro and 1 Frontignac vine, 1 Calmac pear, 1 brown buorrie pear, 1 ribstone pippin apple, 1 of king Pipin's apple, two white currants, 1 roaring-lion gooseberry, 1 black currant, 1 incomparable peach, 1 red Roman nectarine, 2 mayduke cherries, 1 green gage plumb, 1 Orleans plumb, 1 apricot (Moorpack,) and 1 fig tree. The above named fruit trees arrived in the finest order, and are all in a most flourishing state, a clear proof that much attention has been bestowed on them since their arrival in India.

From Dr. Griffith, Superintendent, Hon'ble Company's Botanical Gardens.

A large assortment of seeds of most esteemed kinds.

From the same gentleman by dak banghy, a small hamper of cuttings of rare and most acceptable plants packed in mould and moss, &c. This novel and most successful mode of sending cuttings, is deserving of the best attention of all lovers of Horticulture and Floriculture.

From Walter Landale, Esq.—Some Assam tea seed.

From J. F. Caston, Esq. of Monghyr.—Two Caubul vines.

From Captain Don, several Constantia vines.

From H. C. James, Esq. 32nd Regt. N. 1.—Six vines of the white grape in very fine order.

From Captain Lewis, 32nd Regt. N. 1.—A few Darjeeling potatoes, some acorns, chesnuts, and raspberry seed.

From G. W. Bartlett, Esq. of the Judicial and Revenue Department, Calcutta.—An assortment of plants, such as the ivy-leaved, Leicester and horse-shoe geranium, poinsettia pulcherrima, verbena triphylla, euphorbia jacquiniiflora, passiflora kermisina. All these arrived in most excellent order, and we are much indebted to Mr. Bartlett for his continued favours and contributions.

From Lieut. Colonel Lloyd, C. B.—Several apples of the Darjeeling potatoe, the seed of which will be sown in due season experimentally.

From C. Stuart, Esq.—A large supply of West India arrow root bulbs, or tuberous roots, also a cane of a beautiful cedar tree procured by him whilst in England. The cane answers to plate 13,537 at p. 806 of Loudon, where it is called cedrus or cedar of Lebanon.

From Dr. Griffith, Superintendent, Hon'ble Company's Botanical Garden.—A packet of very fresh fruit and vegetable seeds, all from Portugal; likewise the seed of the cork tree. The whole of these are most valuable acquisitions. For the continued and solid assistance of Dr. Griffith in supplying, (and on several occasions anticipating) our wants, we beg to offer our sincere acknowledgments.

It affords the Society much pleasure to publish the names of the following additional subscribers since our last report:—

T. V. Seddon, Esq. of Meershedabad.

Raja Oodit Narrain Sing of Kurowah, Alumnugger.

C. Stuart, Esq. of Kunjurpoor

It is the intention of this Society to have an exhibition of Agricultural produce in April. Immediately after, two silver medals received from the Parent Society for 1843, will be awarded.

One for the best samples, (not less than five seers of each kind,) of grain.

The other for the best specimens of cotton, tobacco, potatoes, &c.

The Zumeendars, Ryots, or Kachees to be in possession of a certificate, that the samples brought to the show rooms are *bond fide* the produce of their estates.

T. E. A. NAPLETON, *Secretary*.

February, 1844

PROGRESS OF VARIOUS CULTURES IN THE LUCKNOW HORTICULTURAL GARDEN.

Extract of a letter from Captain. G. E. HOLLINGS.

Yours of the 12th January reached me two or three days ago. I shall feel much obliged for the maize seed. I have a fine specimen just coming into fruit; I received the seed from you. Although I cannot yet compete successfully against all the gardens in the city and cantonments in every thing, I have grown some excellent specimens of vegetables from the seeds you sent me; and many flower seeds which I got from England have germinated, and one of the tulip bulbs you sent me has sprouted; two more are still alive, but have not yet struck. Hitherto the season has been particularly favorable, there is promise of an abundance of fruit from the loquat trees, and it seems from the number and strength of the blossoms, that the mango season will be particularly favorable. The vines are now being cut, and the roots covered over and manured. I have not forgotten your commissions regarding the cuttings, which shall be sent to you as well prepared as I can effect. The vines from the seeds given to me by Sir William Nott, G. C. B., are still alive, and are coming into leaf. There is a very fine crop of tobacco, from seed kindly sent by you, and our arrow root promises very well. I hope to be able to succeed better in the packing this year than I did last. I will send a packet of tubers as well as of the prepared powder. The cotton from acclimated seed has thriven very well, but I cannot get persons to make thread properly. I will, however, forward some of the raw cotton, as well as some thread to you.

I have English cucumbers and melons progressing towards ripeness, which is unusual at this season of the year. The cauliflowers have been particularly fine this year, and there is a young crop of them, and of peas, cabbages, beet-root, celery and lettuce, from seeds sent to me direct from England, which were planted just before the late golden showers of rain fell, and which are getting on famously. My experiments regarding the pine-apple have succeeded much better than I anticipated, and I have some very promising plants.

I shall feel much obliged for any specimens of fruit trees, (English,) which you can afford to send me, and I should much like to get supplies of sugar cane, pine-apple crowns, leechce trees, and the finer description of plantains.

In furtherance of the objects, the accomplishment of which is contemplated by the Society, I shall be happy to give any of the members who may require them, acclimatised seeds of every fruit, flower, and vegetable which I may succeed in rearing, and if you think proper, you may advertise, that any application made to me will be attended to; the seeds will be furnished *gratis*, but the parties receiving them, will have to pay the expenses of transit.

My strawberries and apple trees are not so forward as the cantonment ones, which may probably have been caused by some delay in transplanting, and a comparatively poorness of soil; the plants and trees are however very healthy, and I expect that next year I shall be able to spare some thousands of the former to friends at Cawnpore, Seetapore, and Secrora. I have in my own garden, the only two dahlia plants at Lucknow, one has produced a very handsomely colored flower, (deep red,) but of inferior size; the other is sickly, and I have cut it down. I hope to be more successful with the roots next year. I intend to indent on my friends for a supply of bulbs, and shall feel obliged by your sending me any varieties, especially of double ones, procurable in Calcutta.

I have lately received some hints regarding the cultivation of vegetables and flowers from the Rev. Mr. Carshore, the Clergyman at Cawnpore, of which I shall avail myself practically, whenever opportunity offers.

I do not see any mention made of the narcissus amongst the flowers exhibited. I could send you a supply of bulbs, if you would like to have some.

I see by the Journal, that my friend Lieut. Brooke of the 63d, has been more fortunate than I was in finding the real *Orchis mascula*, which produces the saffron of commerce; but I am convinced, that it grows in the vicinity of the Oude Teraee, and I will, if possible, send you specimens.

It appears to me, that the climate of Oude would be very favourable to the silk worm, as the mulberry thrives very well, as regards its foliage, I should be glad to get a supply of eggs if they can be procured in Calcutta, and to send the silk to the Society for examination *

RESULT OF TRIALS ON CEREAL GRAINS, HEMP, FLAX AND
VEGETABLE SEEDS.

*Extract of a letter from T. J. FINNIE, Esq. dated Agra, 30th
December, 1843*

While upon this subject, I may as well inform you of the result of the wheat, barley, and oat seed you sent me. I am sorry to say, that notwithstanding the great care which was taken in planting them, not a seed has come up, except the Hopetown oat, the Common oat, and the naked oat; all of which came up well. Of the grain which you sent in the heads or spears I did not expect much, as it was the worst I ever saw any where. The packet of wheat which came in the box which was so long on the road, and another which I received last year too late for planting, I suppose had been bladed by the effects of the climate. The English and Russian hemp seed both failed to germinate. The English flax seed came up, but a good deal of it died, and left the remainder so scattered, that a great many branches put out from the root, which ought not to be the case with good flax; it only reached the height of about a foot, which of course rendered it worthless. I have found the Cape and American vegetable seed uniformly good when planted by Capt. Munro, Secretary to the Agricultural Society, or myself, but they have as uniformly failed when the planting was left to the native *mallies*, who either sow the seed in ground which is too wet, or sow in perfectly dry ground, and then flood it with water; in either of which case.

* Steps have been taken to meet this request.

they never come up. Great care is here necessary in the preparation of the ground for the reception of seed. Water it thoroughly, and let it lay two or three days until it crumbles, when dig up; when in this condition, turn it up thoroughly with the spade, and smooth it with a rake, then plant the seed and wait until they appear above the ground before watering them, or if watered at all, let it be with a rose watering pot, and if the sun is very powerful and the plants delicate, shade the bed during the heat of the day, and I think you will find the seed better than they are generally supposed to be.

Extract from a Memoir on the Medical Topography of Tirhoot. By
K. MACKINNON, M. D., *Civil Assistant Surgeon*

I. The district of Tirhoot, in the province of Behar, is situated on
Situation, Boundary,
&c.
the North side of the Ganges, bounded by that
River on the South; on the West by the great Gunduck River, on the East by the district of Purneah, and on the North by the great Saul forest of Nepaul, commonly called the Terai. It lies in the 26th and 27th degrees of North Latitude, and in Longitude 84° to 86° East. Beyond the Terai lie the Nepaul Mountains which are visible in clear weather from almost every part of the district, and occasionally the snow capped summits of the Himalayah ranges may even be seen. The prevailing winds are from the East and Westward. The former blows pretty regularly from the beginning of April to the setting in of the cold weather, during which season, there is much irregularity, as to the winds which may prevail. When cloudy, and threatening rain, the wind is usually Easterly; should a heavy storm come on, it veers round to the North, and the weather generally clears up by the setting in of a fresh breeze from the Westward; as the cold season advances to the end of January and to February, this wind continues to blow strongly for days, and even for weeks together, accompanied by a cold, bracing atmosphere, than which nothing can be more delightful. In March, though the sun gets powerful, the weather is very pleasant, and the wind is still Westerly. In April, East winds blowing fresh during the day and night are most common, but not unfrequently from twelve at noon till evening the wind blows strong from the Westward.

In May, East winds prevail still more, and even when Westerly they have not the dry parching character of hot winds up the country.

During the six years I have been in Tirhoot, I have not known a week's continuance of what could be called a hot wind.

II. Tirhoot abounds with Lakes, Rivers and Jheels. The principal
 Lakes, Rivers, Tanks, Wells, &c. Rivers are the Great Gunduck, the Byah, Little Gunduck, the Bhaugmutty, the Luckun-Dye, the Buckiah, and the Kumlah, the sources of which, and the courses they run, will be seen in a rude map which will be appended to this memoir.

The yearly inundation of the country by these rivers is a chief point of interest. During the months of July and August the rains fall heavily, (appended is a Register of the number of inches, during the months of July, August and September for 7 years.) These rains are followed, as a matter of course, by the rising of the rivers, which, from about the middle to the end of July, are wont to overflow their banks, covering the face of the country with their superabundant waters. What I call lakes, are sheets of water which are situated generally near rivers, and appear to be old beds of the streams from which each is now annually replenished with water. They generally bend in a horse-shoe shape, and are very narrow in proportion to their length. The origin of these sheets of water is an interesting subject of inquiry to the physical Geographer, but to the Medical topographer they possess that painful interest, which arises from a knowledge of their being a prolific source of disease. When the rivers with which they are connected, fall below a certain level, the water ceases to drain from them. Stagnation ensues, vegetation progresses along their edges, and as heat and drought increase, the aquatic plants with which they abound decay, producing malaria.

Jheels or rice chowels are very abundant in Tirhoot. These seem to be natural basins for the reception of the superabundant waters which would otherwise swamp the whole country. The district may be said to consist alternately of ridges of comparatively high land, and of the chowers in question, the slope being in most places very gradual. Many of these Jheels are however not dependent solely upon the rain water for their supply, for they have in many instances a communication with the neighbouring rivers, which fill them as they rise. The annual drying up of this water is effected altogether by evaporation, and it will be readily believed that these Jheels are fruitful sources of disease and death, and they lie on so low a level, that even if the rice crop did not depend on their supply of water, drainage would be impossible. The Wells in Tirhoot are very numerous, and in general good, but in not a few instances the water is impregnated with saline ingredients, rendering it slightly brackish. There are numerous Tanks also, and in the

Northern and Eastern parts of the districts, some of these are of enormous extent, and it is thought of great antiquity.

III. The climate of Tirhoot is reported to be of great salubrity, and

The climate,—its Physical character, and Medical effects, with the highest, lowest, and medium state of the Thermometer

for Europeans it undoubtedly is so, which I attribute to the following circumstances. * As will be seen by the annexed Thermometrical Table, the ranges of temperature are not great, comparatively speaking. We are exempt from the extreme and sultry moisture of Bengal, and the parching dry heat of the Upper Provinces. Whilst, as already mentioned, the range of the Thermometer is moderate.

I have no data to prove the assertion, but I believe that comparison will shew, that the range here, in twelve months, would be lower by some degrees than at Patna. The face of the country continues covered with vegetation during the hot months—Is this the cause or the effect of the temperate climate I stop not to inquire. The vicinity of the hills must too have some effect upon the temperature.

In judging of Tirhoot as a climate for Europeans, it must be borne in mind, that all the Europeans who live in it are of the higher ranks of society, and in the possession of comforts, and in the enjoyment of at least full means of subsistence; and these things, it is not to be disputed, contribute to health as a general rule, and more especially do they act as safeguards against some of the diseases to which the human constitution is prone in Tirhoot, such as Fevers, Cholera and Dysentery. It is also to be mentioned, that the Indigo Planters, who are the chief residents in Tirhoot, are men who take violent and constant exercise; living also in good houses, and to this former cause, as much as to the temperate climate, do I attribute the robust health they enjoy. It is indeed so robust as to be remarkable. These gentlemen look more like English farmers than tropical residents, a fact that is worth the public notice, for it is my belief that a sedentary life is a chief source of disease in India*.

For Natives, the climate of Tirhoot is I think very unhealthy, and the chief source of disease is malaria, acting of course more or less virulently according to different remote causes, such as diet, peculiar locality, comforts of residence, as to cleanliness, airiness or otherwise, and producing according to the modified operation of such causes, fever, dysentery, cholera, &c. Here is a subject with which I might fill pages, and yet leave much unsaid, and my own anxiety to do good unsatisfied.

The poor natives exercise the worst possible judgment in the site of their villages, and in their houses they have from the lowest even to

* I speak of course with reference to the European resident.

those who might afford it, no comfort, and a sad want of cleanliness. They moreover, during the worst seasons of the year, almost live upon half ripe fruits and vegetables. These, alas, are things which it will take time to remedy, but there is one great source of disease very easily got rid of about every village; there are numberless deep holes, which in the rains fill with water, this of course becomes stagnant, and gets mixed with all sorts of impurities. These puddles are formed by the digging out of mud for making walls to their Houses, but a few local Police Regulations might convert them into useful drains for carrying off all manner of impurities, and thus add greatly to the public health.

IV. The soil of Tirhoot varies much in character in different parts of the district. In the more Southern and Eastern parts, it is sandy and alluvial, frequently mixed with Carbonate of Soda. In the Northern Pergunnahs there is more clay, and a mixture of Iron-salts is not uncommon; Salt-petre also is abundantly found. To the Westward again the soil is *rich* in alluvial quality, with little saline mixture. The face of the country has a rich and picturesque appearance, being beautifully wooded, especially on the banks of the lakes, where the scenery is absolutely fine.

V. On this head I do not consider it necessary to say much; having little or nothing new to offer. The breeds of the different domestic animals do not differ in any material respect from those of the neighbouring provinces. Amongst the numerous herds of bullocks used by the Indigo Planters in Tirhoot, some are to be seen of great size and power: cattle die in great numbers in the cold and wet weather, and in the hot months, they are subject to a disease which the natives call by the name for small-pox, and which I believe to be identical with the same disease in the human subject.

Sheep are numerous and good, but their wool is fit only for the manufacture of coarse blankets; small native horses are numerous in comparison to what they are in Bengal and some other provinces, and some of them are capable of enduring long exertion.

Wild water fowl are in great variety, and so numerous that 1,400 may be seen at a time in some of the many Tealeries kept by Europeans.

The native Catholics in Bethali rear numbers of Turkeys for the Tirhoot market; but neither these birds nor guinea fowls can be plentifully reared in Tirhoot. In short, it may be said of all the domestic animals, that in the breeding and rearing of them, there is much room for improvement. Game is pretty plentiful in Tirhoot, the objects of the chase being the same as we find in other parts of the country. The

Nepaul forest abounds in the various animals found in the jungles of India. That able naturalist, Mr. Hodgson, has fully described the denizens of those wild and solitary regions. Wolves are said to be increasing; several of the smaller species of the feline tribe are rather destructive about farm yards, one closely resembling the Lynx was lately killed near Burrah factory, and another animal said to be hitherto unknown (probably from its retired habits) namely the Paugolin of Buffon, corresponding exactly with his description. The Porcupine is common in some parts of the district, and on the jheels to the South-East, the Otter has been killed by sportsmen, and also taken alive and tamed. Fish is plentiful and of many varieties; alligators of enormous size, as well as the Gurrecal or crocodile, abound in the lakes and rivers.

Of mineral productions, strictly so called, Tirhoot affords none. But the soil, as already mentioned, is abundantly impregnated with neutral salts. The carbonate of soda used by the Native Washermen, lies in many places so thick on the surface of the soil as utterly to prevent vegetation; saltpetre too is very abundant.

VI. Agriculture is carried on in Tirhoot to as great and varied extent as in any District in India; but still the favourable soil and climate afford much room for improvement; as even those amongst the natives who might command the means of improvement, are supinely content with the indifferent and degenerating sorts of some of their most useful esculents; and British example and patronage in respect of the introduction and grafting of new fruits and vegetables, and of new methods of cultivation, have no hitherto been much displayed, excepting by some of the Indigo Planters, to whom in fact Tirhoot is indebted in every point of view for much of its present prosperity, and for all that it has advanced towards the arts and civilization of the West. Rice is cultivated partially all over Tirhoot, but largely to the North-East, where the extent of low or chower land is comparatively so great. On the higher lands are to be seen Wheat, Oats, Barley, Maize, Millet, Flax, Sugar-Cane, Hemp, Cotton, Castor Oil plant, and Putwa (used as Hemp for Ropes), besides many sorts of Pulse or Dhal, and of the smaller plants of the natural order Gramina, the three species of mustard seed so valuable to the Natives. Also fields of edible and medicinal roots, the Yam, Sweet Potatoc, Soontee, Ginger, great Arum, Turmeric, the Gemaiah Uddruck, the Ec-unglee, the Diabda, the Kurree Huldee, four of the same genus as the Ginger and Turmeric, and the last named a very singular looking root, being when cut through of a bright blue tint as if steeped in Indigo.

Aromatic seeds are grown chiefly to the North-West. These and Coriander, Amide Seed, Agwain, Zeera or Fennel Seed, and the long red Chili Pepper is extensively cultivated; the Pawn Leaf is abundant and cheap.

For native crops, the mode of tillage is generally rough and imperfect, though the cultivators are most industrious. Want of capital checks good farming here as elsewhere. The land taken for the indigo planting, is brought in Tirhoot to the finest possible state of culture, and in the vicinity of the numerous scattered factories, amounting in Tirhoot and Sarun to upwards of 60 (including branch factories or out-works) carrots and turnips and sugar-cane are cultivated to feed the factory Bullocks, also Mangul-Wurzel, besides well tilled and beautifully extensive fields of Oats for the numerous Horses required by the Planters, and near Poonah for the Company's stud. The Potatoe in one or two instances, where the soil is light, has been obtained of really good quality. Experiments have been tried of planting this favorite root on high beds, with trenches between, this plan has produced good Potatoes, but in one instance those reared on a level and irrigated field, surpassed in mealiness any ever seen in India; but whether this superiority was from the soil chiefly, or from the mode of culture, is from paucity of experimental agriculturists, still doubtful. Much might be done by combination of enterprise.

Of Fruits, Tirhoot yields a variety, and might yield a much greater Digah Farm has been an useful circulating nursery for objects of Horticulture, and the gardens of many Europeans, and a very few Natives in Tirhoot, afford good fruits, such as the Bombay and Malda Mangoe, the large green, and the small black Constantia grape. In a few instances, some fine specimens of several sorts of English Apple and Green gage, the latter requiring however to be laid in Cotton to ripen, the Lechee, Loquat, Citron, Shaddock, Lemon, Lime, Guava, Plantain, Custard Apple, Corinda, Wampee, Brazil Currant, and Love Apple, Melons of various sorts, but not high flavored, the Pine-apple seldom very good, the Strawberry rather fine, and with care abundant, the Cocoa-nut tree is seen, but in very few gardens in Tirhoot. At Mozufferpore however there is one garden belonging to a Native Zemindar, which does credit to his son's taste: for it contains Cocoa-trees, and amongst other foreign plants the Cinnamon and Betel from Bengal. Besides the above mentioned fruits, the Bazars of Tirhoot are supplied with the Jack, the Bazila, the Tamarind, the Oola or Sowfi-nut. The water Melon, which with its seeds affords both drink and a light food from the kernels, is sown in small pits in the beginning of the hot sea-

son, in the sandy soil of dried up river beds, and on the village roots, the Pumpkin, Cucumber and Gourd are to be seen. It would be tedious to enumerate the various sorts of vegetables, both leaf and pulse, or bean, used by the natives. Their resources in this poor diet are many, and yet this year, from want of capital, and a partial failure in the rice crop, there have been many deaths from starvation the poor Ryots plucking the scarce formed ears of the Rhubbee crops, and cooking them. And at Mr. Y.'s factory several hundreds of women and children receive a daily dole of rice, thus shewing, that from interest as well as inclination, it is the planters' duty to protect the peasantry. The Poppy rears itself in gay luxuriance around the villages, the Bang, an intoxicating weed, is often sown, the Date and Tartree, yield the useful and also pernicious toddy, but the fruit of the Date tree in Tirhoot is very indifferent. European flowers thrive in this climate, also some of the Nepaulese and Persian shrubs, and the Mulberry grows with great vigour. Tobacco is raised in great quantity, and the varieties of this plant sent to Tirhoot from the Agricultural Society thrive beautifully.

As connected with, though not belonging to, the subject of Agriculture, a few words on the manufactures of Tirhoot may be of some use, even though differing little from those of other districts. Cotton cloths are woven in Tirhoot for home consumption, but English Calico, both white and printed, are used also by the natives, the country cloths being almost all of very coarse texture and more expensive, though less perishable than the British. They are more costly than the American fabrics which are now used at some of the Indigo factories. Combs of wood and Buffaloe horns are coarsely made. Hemp is manufactured here into coarse sacking, and this when old is converted into paper.

From the fibres of the stalks of the Putwa, a plant of the same class as the Cotton, ropes are manufactured as well as from hemp; while the flax is cultivated for the produce of the linseed oil alone; no attempt having been made to prepare its fibres for the manufacture of linen. From the several sorts of shells of the rivers, both univalve and bivalve, lime is constantly prepared. Potter's clay seems good and abundant in Tirhoot, though the common vessels manufactured here are not so strong, and do not resist fire nearly so well, in the opinion of the natives as those which they occasionally import in very small numbers from Bengal; and no attempts are made in Tirhoot at any finer earthenware, than the shining black sort covered with a kind of Oil varnish. Carpenters and blacksmiths are employed in great numbers at the Indigo factories, and some of them excel in their respective trades to a degree

that gives reason to think, that by more encouragement, their ingenuity might prove very great.

The manufacture of woollen fabrics is restricted by the bad quality of the wool. Some few specimens of the English sheep are now in the district, but it is not likely that they will improve the quality of the wool, to which object the climate seems an insuperable obstacle.

VII. The annexed sketch map will shew the line of the different roads. Those marked "Government" were originally
Roads and Communications. formed by Government, but are now in many parts repaired by the Indigo Planters; and the lines of road marked "P" are made entirely at the expense of the Planters; and being under their immediate and daily inspection, are most of them pretty good, and some of them (those near Barraha factory especially) are wide and finely raised and sloped to each side gradually, having in the principal thoroughfares, on both sides of the raised road, a low road for the bullock carts to pass along during the dry season, when the high road would otherwise be much injured, the Westerly winds blowing away the soil loosened by the constant track of the heavy wheels. The mark "B." indicates the places where bridges are chiefly needed. The Indigo Planters find that a comparatively small annual outlay on their roads and bunds, is an ultimate saving; and these roads are of course of incalculable advantage to the native traffic. The North-Eastern parts of Tirhoot are, for want of raised roads, quite inaccessible during the rains for wheeled vehicles; and sometimes even for foot and horse travellers. So much so, that in the event of any hostile invasions from the Nepaulese, half of Tirhoot might be laid waste, ere troops could march to its protection. The great Gunduck, Little Gunduck and Bhagmutty are partially navigable throughout the year. The other rivers are not so.—*From the India Journal of Medical and Physical Science, for January, 1844.*

A Commentary on certain passages in the Physiological Writings of the late
 THOMAS ANDREW KNIGHT. *By* W. WOOD.

ON THE ADVANTAGE OF EMPLOYING VEGETABLE MATTER AS MANURE IN A FRESH STATE.—Opinion, founded upon experiments, "that many vegetable substances are best calculated to reassume an organic living state, when they are least changed and decomposed by putrefaction."

First experiment, upon a seedling Plum—*The seed* placed in a small garden-pot, and nearly filled with living leaves and roots of grasses,

mixed with a small portion of mould, placed under glass, without other artificial heat, appeared in April—was removed into a larger pot three times during the summer, each time with same kind of material for potting; end of October occupied about one-third of a square foot, at which period its height was 9 feet 7 inches. Further experiments in manuring Turnips with green fermented Fern and black vegetable mould, and branches of trees in every stage of decomposition—the latter applied four-fold more than the former—the result being greatly in favour of the former; the growth, &c. being much more rapid than the effects from either vegetable mould or stable produce, and distinguishable in the autumn from the rest of the field, by the deeper shade of their foliage. The above experiments conceived to be satisfactory, in showing that any given (I presume *proportionate*) quantity of vegetable matter can generally be employed in its recent and organised state with much more advantage than when it has been decomposed, and no inconsiderable part of its component parts has been dissipated and lost during the progress of putrefaction and fermentation.—*Hort Trans.*, vol. xvii.

Remarks.—This interesting fact, though valuable in its results when applied to the cultivation of plants remarkably robust in constitution, or known to be gross feeders, and under the most favourable circumstances, does not appear equally applicable to the general cultivation of exotic plants in pots. Had the experiments been applied to the management of ornamental plants, even in the attainment of a medium growth, I have no doubt that the results would have been less favourable, for the following reason:—*The higher we rise in the scale of cultivation, the more powerful are the agencies required to effect our purpose.* And in the cultivation of plants intended for superior growth, there are many instances of extreme fluctuations of temperature, to which the amount of counteractive agency is unequal; and hence I infer, from abundant evidence, that the mechanical texture and effect of undecomposed vegetable matter would by no means balance the injurious influence of its absorbent properties. The undefinable variations of vegetable structure and capability of assimilating matter as food, under equal variations of atmospheric and solar agency, would preclude the application of undecomposed vegetable matter in many elaborate processes of cultivation. The accumulative system of culture is negatived in the above facts.

ON THE MOST ADVANTAGEOUS FORM OF GARDEN-POTS.—“I have constantly found the growth of trees to be most rapid when the roots and leaves are brought nearest to each other, under similar external circumstances; and the horizontal space necessarily occupied by the

leaves and stems of plants will in almost all cases exceed the width of the pots, of the form now recommended; the width of each being as 8, its depth will be as 6, and its smallest width at its base as 5, inside measure."—*Hort. Trans.*, vol. iii., p. 378.

Remarks.—At p. 110 of "Paxton's Magazine of Botany," an opinion is offered that "the capability of roots" to fulfil their natural functions will be in proportion as modes of cultivation approach Nature so nearly, as to permit their free *extension* and *ramification* in search of elementary substances, &c.: and that it will probably be found that the amount of food thus obtained will be commensurate with the *dispersion* of the roots over a given surface," which opinion appears strictly to coincide with Mr. K.'s view.

ON THE APPLICATION OF MANURE, IN A LIQUID FORM, TO PLANTS IN POTS.—"A large extent and depth of soil seem, therefore, to be no further requisite to trees than to afford them a regular supply of water, and a sufficient quantity of organizable matter; and the *rapid growth* of plants of every kind when their roots are confined in a pot to a small quantity of mould, till that becomes exhausted, proves the truth (sufficiently) of this position."—*Hort. Trans.*, vol. ii.

Remarks.—It would appear from the "rapid growth" here spoken of, that Mr. K. believed plants capable of the most rapid growth when confined in small pots and removed to larger, according to the ordinary and restrictive system; but this opinion can be only maintained by showing that a small plant removed in its young and excitable state to a *larger* quantity of soil, of a *texture* and *quality adapted* to its growth, and so mechanically arranged as to enable its tender organs progressively to assimilate its food without being liable to an *impeded* circulation of moisture,* is, in reality, making a slower progress to maturity than a small plant, "confined to a small quantity of mould." But the real difference I presume would be, that the former, by a judicious *adaptation* of its organs to the increased amount of agency brought to act upon it, would be attaining an *accumulative* vigour by a uniform development of its axillary buds, and consequent deposition of a uniform amount of organizable matter, whilst the latter, if allowed to surpass the other by a more rapid growth, could only do so by an attenuated growth, which is invariably connected with abortive or undeveloped leaf-buds. In the former, accumulation is not only *progress*, but *maturation*, in the latter, rapid growth is abortion, and loss of functional power, by the repeated intervention of secondary causes, each of which interferes with an

* Paxton, p. 110.

ultimate effect. This paper fails to recognise an principle which involves the application of higher agencies in Nature, or any modification of organic matter, to be rendered *successfully* applicable to the different stages of growth.

ON THE CULTIVATION OF THE PINE-APPLE.—“The temperature of the house raised by means of *solar heat* from 95° to 105°, sometimes to 110°, no air being given till the temperature exceeded 95°. The compost of *thin green turf chopped* very small, and pressed *very closely* whilst wet; a circular piece of the same material being inserted to occupy the bottom of each pot; having found this substance most efficacious for draining, &c., and subsequently of facilitating the removal of a plant from one pot to another *without loss of roots*. The pots *elevated* upon brick piers near the glass.”—*Horticultural Transactions*, vol. iv.

Remarks.—This paper bespeaks an advance in the principles of cultivation, and tends to illustrate the first principles of Horticulture. There is the application of higher agencies, which, in some measure, may be regarded as a new power, subservient to the highest possible effects in cultivation; and, in the “chopped green turf, is given a texture and mechanical arrangement, adapted to the power of the agency applied, and the attainment of a uniform circulation of moisture.” This paper may also be considered a full illustration of the following opinion given at p. 112 of Paxton’s Magazine, viz. :—“Atmospheric and solar influence should be so modified as to balance the power of absorption to which plants are exposed, &c.” There are also valuable inferences to be drawn from the use of *chopped turf*, as a “substratum”, or drainage; perhaps a perfect system of cultivation will include the complete subserviency of the *mechanical* to the *assimilative* process in the economy of vegetation. The *safe* “removal of plants from one pot to another, without loss of roots,” appears to be a dim recognition of that “Principle of Horticulture” by which an accumulative system of cultivation must either stand or fall, viz., that “for the maintenance of a plant in health, it is indispensable that the supply of fluid by the roots should be continued and uninterrupted” (Principles, 32). Here it may be observed, that until it can be proved that the removal of plants from one pot to another does, in *no wise*, affect them injuriously under the *same circumstances*, the principle now quoted must for ever decide the question of expediency. The removal of plants without loss of roots is certainly desirable; but the question again recurs—Can they be removed at all without sustaining a loss of that *functional power*, by the continued uniform reciprocal action of which the “supply of fluid by the roots” can alone “be con-

tinuous and uninterrupted?" Every hour's experience denies the possibility of this.

ON THE CULTIVATION OF THE COCKSCOMB.—"Treatment similar to the Pine-Apple, having a similar object in view. A single flower-stalk of great strength is requisite, the protrusion of which should be retarded as long as possible, consistently with the rapid growth of the plants. Compost, nutritive as possible, and stimulatory, of unfermented horse-dung, *fresh*, burnt turf, decayed leaves. Two parts green turf, the latter being in *lumps* of about *an inch* in diameter, to keep the mass so hollow for escape of water (uniform circulation) and the air to enter. Plants put *very young* (small) into pots 4 inches diameter and 3 inches deep; 'as soon as the roots had reached the sides, in no degree matted, they were transferred to pots of a foot in diameter and 9 inches deep. Particular attention paid to the roots, having reason to think that the *compression* of them in the pot has under all circumstances, a tendency to accelerate the bloom. Under this treatment the plants became large and strong before they manifested a disposition to blossom. Plants placed within a few inches of the glass, and subject to similar heat as the Pine-apple plants."—*Hort. Trans*, Nov. 1, 1830.

Remarks.—The above instance of cultivation may be considered a full recognition of a progressive and accumulative system of cultivation, illustrating a rule to be observed in cultivation generally, that *maturity of growth* should be antecedent to, or contemporaneous with a development of bloom. It also points out the necessity of a mechanical arrangement of soil being equal to a uniform circulation. A rejection of the ordinary mode of repeated shifts is here decisive of the applicability of small growth to comparatively large masses of soil, if, in the first instance, adapted to the ultimate object, by arrangement, exposure to intense agency, &c.

The risk attendant upon "a compression" of the roots may be adduced as an additional evidence of the evils connected with repeated shiftings. If a slight "compression" of the roots tend to "interrupt" the circulation of fluid from the roots, what must be the effect of the whole inward resisting medium of smaller on larger pots? If "compression" interferes injuriously with ultimate effect, then all inverted growth must be subversive of the vital energy of plants.

ON THE CULTIVATION OF THE PINE-APPLE.—"If the bark-bed could be made to give a steady heat (temperature of about 10 degrees below that of the day temperature of the air in the stove.) I readily admit that the plants would thrive better in a compost of that temperature than in a colder; for the temperature of the day being about

90° or 95°, and that of the night 70°, the mould in the pots will necessarily acquire nearly the intermediate temperature of 80°. It is true that two disturbing causes are in action—the evaporation from the mould and porous surface of the pots and the radiant heat of the sun; but these causes operate in opposition to each other, and, probably, nearly negative the operation or influence of each other, as far as respects the temperature of the mould in the pots.

“I have never yet seen plants of the same age equally strong, nor any produce fruit better—so well swelled, nor so rich in flavour.

“But I have never taken off nor shortened a root, nor taken any other measure to retard the period of fructification, with the prospect of obtaining larger fruit, and my plants have always shewed fruit when 14 or 15 months old, though propagated from small and young suckers and crowns.

“The compost as before given for Cockscombs is the most stimulative of growth. Pine-plants will, however, grow perfectly well in composts of different kinds, but I have found that they have succeeded best when the materials have been fresh, and retaining their organic form; particularly if the pots be large relatively to the size of the plants, which I think they always ought to be, for the mode of cultivation recommended. I have used with advantage the haulm of Beans, cut into lengths of about an inch each. I found that the plants succeeded best in the warmest part of the house, where the flue first enters, and where the temperature is very high, varying from about 85° to 105°, and the air exceeding dry.

“Of Suckers. When the whole of the suckers are removed at an early period, one or more very strong suckers usually spring out below the level of the soil; and from these, suffering only one to remain attached to the parent stem, and preserving the roots as entire as possible, I have propagated with much advantage, and have obtained plants which shewed fruit strongly at seven months, dating from the period at which the sucker appeared like a strong head of Asparagus, at the surface of the soil.”—*Hort. Trans.*, vol. iv., p. 513.

Remarks—The foregoing statement appears to involve, and to a great extent, to illustrate, the principles upon which a progressive and accumulative system of cultivation depends; while speaking of the medium temperature that is most desirable, and of the opposing agencies of absorption by the mould and surface of pots, &c. with the radiant heat of the sun, I think that the balance or “negative” influence of these causes is more or less embodied in a former paragraph (p. 788.) where it is stated that a due exposure (of plants) to atmospheric and

solar agency is requisite; that sentence alluding to "a balance of the power of absorption," &c.

The superior growth of the plants and the excellence of the fruit, compared with the age of the plants, is a sufficient proof of the superiority of an accumulative growth over an opposite treatment; and this instance, connected with another cited at the conclusion of the paper, wherein Mr. Knight refers to suckers showing fruit at seven months, may be adduced as an anticipation in practice of what I have advanced in theory (by the light of practice,) relative to the highest test of cultivation; namely, "that which attains the greatest constitutional vigour within a limited period." The very young state in which the suckers were removed further confirms the remarks at p. 710, that the vital functions of plants are diminished in force, in proportion as the primary development of their parts is prematurely hardened or matured, whether by the deficiency or excess of the elements which sustain them; and again, p. 734, "it is the elementary condition of an organised being which favours the ultimate development of its parts."

Mr. Knight admits not having "taken off, shortened," or otherwise disturbed the roots in the process of culture. I believe I may cite this as fully bearing me out in the principle I have laid down (p. 710,) as to the law or condition which is essential to perfect accumulative growth, namely, that "the accumulative vigour of all plants is exactly in proportion to the progressive agency of the cause to which they are first subjected," &c. &c. Indeed, the whole of this instance of cultivation appears to be in harmony with first principles. In the first place, we have proportions of compost, their texture and qualities, their mechanical structure (in pieces, &c.) and arrangement, so as to prevent impeded circulation—a method which supposes a union of several parts, adapted to a common end, and implies a principle of unity with progression, or, in other words, progressive transition without breach of continuity. This definition is, I conceive, strictly applicable to a system of cultivation which produces a progressive and accumulative effect, and strictly in harmony with the first principles of Horticulture, which affirm that "For the maintenance of a plant in health it is indispensable that the supply of fluid by the roots should be continued and uninterrupted. "The only means by which this continued and uninterrupted supply of fluid may be obtained will be by such a combination of materials, of their relative proportions, textures, qualities, arrangements, and exposure to certain agencies, as will be equal to maintain a regular progression of the functions of life, from the first development to maturity of growth. Such is the only law by which a comparatively

perfect system of cultivation can be established. Every other process than that which involves unity of parts with progression of growth may be invariably conducive to inferior results, but the laws which govern organic and chemical affinities, will never allow it to be productive of the highest possible effects. A disorganization of vegetable structure is attended with a loss of functional power which no process can entirely re-establish.

"A few days after the annexed paper was read, I had the pleasure of observing (being on a visit to the President, &c.) the condition and appearance of the Pine-Apple plants described by him. The plants, which were then expected to be shewing fruit in the next month, though young, were remarkable for their vigour and strength. They were grown in pots of much larger size than usual, which were raised so as to bring the upper leaves nearly in contact with the glass; the plants firmly rooted and leaves of peculiar breadth, &c.—*Hort. Trans.*, vol. iv. *Note by the Secretary.*

Remarks.—The above remarks afford additional evidence in favour of an accumulative system of cultivation, and though it is not stated that the plants were removed or transferred to such large pots in their youngest state, yet it is a close approximation to it, and may be considered illustrative of a paragraph at page 709, viz.—"The leading feature of the former (accumulative) is found in its adaptation to attain a maturity of growth, apart from the aid of intermediate shifts, by removing plants in their youngest state to pots commensurate in size with their ultimate vigour and fertility." It also strongly corroborates the statement at page 734, that "The intensity of atmospheric and solar agency should be in proportion to the amount of material used in the process of potting, &c."

ON THE TRANSPLANTATION OF PLANTS WITH SPINDLE-SHAPED ROOTS.—
"It is a generally received opinion amongst Gardeners, that plants with spindle-shaped roots cannot be advantageously cultivated by transplantation, and it cannot be questioned that the most perfect crops of plants of this habit, both in quantity and quality, will be obtained by permitting them to retain their first situation and position. Fibrous-rooted plants, also, I am inclined to infer, from the grounds above stated, will be found to succeed well under the same mode of treatment, for these would readily emit in great abundance new superficial roots."—*Hort. Trans.*, vol. vi., p. 370, (1826)

The above evidence affords still further and clearer proofs, that a Progressive and Accumulative system of cultivation is the ultimate result of cultivation; although as previously stated in the instance of the Balsams, in which intermediate shifts were dispensed with, it did not oc-

cur to me at that period that such a system could ever be applied to the culture of plants of slow growth; yet a conviction that such a principle does really exist in nature, and would be ultimately successful in the treatment of plants *generally*, was my decided opinion from that period up to the present; and each successive instance of an approach to it has only served to confirm my expectations—that had the eminent experimentalist whose papers have done so much to illustrate and confirm all subsequent experience, been permitted to continue his valuable labours, I have no doubt but ere this, a clear conviction and practical insight into the ultimate effects of cultivation would have led him to affirm what I sincerely believe to be consistent with the principles of Horticulture, that, *physiologically considered, shifting is but a substitute for a worse evil.*

ON THE CULTIVATION OF THE PINE-APPLE.—“Concluded a long course of experiments upon the cultivation of the Pine-Apple, and in ascertaining the effects of excess of drought and of moisture, and of very high and of very low temperature. I have of course sacrificed many plants in experiments, which I neither found nor expected to find successful; but from these experiments, &c., much valuable information was gained, &c. &c. &c.”—*Hort. Trans.*, vol. vii., p. 109, (1828.)

Remarks.—Such is the honorable testimony borne to the valuable results of philosophical research and inquiry, and it would be well if those who are attempting to apply the highest principles of Horticulture to practice, with but a very slender knowledge of the requisite means, would remember that the success of the latter must essentially depend upon the former.

“Very high temperature, if accompanied with a sufficiently humid state of the atmosphere, I found beneficial at all seasons of the year under a curvilinear iron house, for this admitted as much light in the middle of winter as the Pine-Apple plants appeared to require.

“The effects of the excess of humidity in the air of the house were, as might have been anticipated, diametrically opposite to those which had resulted from drought, and the plants grew so rapidly as to become soon too large for the spaces allotted, without indicating at any season of the year a disposition to show fruit.”

Remarks.—The above statement appears to imply a difference of treatment in the cultivation of plants which to a certain extent admit of a progressive maturity of growth, as in many of those with a branching habit, and those whose maturity must depend upon a single accumulative development, as the Pine-Apple, Cockscomb, &c.,—the former not admitting of those artificial processes which render the current of sap subservient to fertility, by diverting its exuberant or perpendicular flow to the formation and support of every developed bud.

"I do not entertain the slightest doubt that as large and larger, and even still larger Pine-Apples may be raised without, than with, a hot-bed of any kind. A requisite degree of temperature, and humidity of atmosphere may be maintained by intense solar agency, &c. &c. &c."

In reference to the above, I may again cite the instance of the Balsams, which I subjected to intense heat and excessive moisture by syringing, apart from the aid of fermenting material throughout the whole process. Such was the exuberant growth on that occasion from the plants being transferred from 60-sized pots to 12-sized, that I had a repeated intention of again shifting them, but the stimulating material in which they were placed proved capable of imparting a vigour far exceeding the expectations of all who saw them, and though cultivated in houses whose structure was favourable only to a dry heat, yet the humidity which they were subjected to daily caused the protrusion of roots above the surface of the soil—a sufficient proof of the genial element and intense agency to which they were exposed.

"To obtain fruit of a much larger size, it will be found necessary to restrain the plants from bearing fruit to a greater age than mine have ever been permitted to acquire, and in such cases it will be found beneficial to remove the plants annually into larger pots. The difficulty of thus removing, without danger to the roots, &c."

Remarks.—Here it appears that Mr. Knight supposed it possible to attain a larger fruit by successive stages of growth. But I am strongly inclined to think that he here lost sight of the principle which he in part carried out, and that if he had then perceived the application of dispensing with all shifts—by the possibility of obtaining a uniform circulation of moisture from a larger amount of material, whether applied in larger pots, tubs, or proportionately sized pits—he would still have attempted it on a larger scale. It appears that his attempts on a small scale—yet then proportionately larger than others believed possible—were crowned with success. And here I would inquire whether his application of vegetable matter in a fresh or undecomposed state was at all favourable to the highest possible effect—whether its nutritive properties were not to a certain extent pernicious, not as an element capable of being assimilated by the roots, &c., but pernicious or unfavourable as a medium by which the remaining chemical agencies were to derive and impart their force? *Is not the efficiency of every cause to a certain extent modified or regulated in proportion to the fitness of the medium through which it operates?* If not, I am perfectly unable to establish a method in support of those principles of Horticulture upon which all that is true in cultivation depends.

Referring again to the materials used in the cultivation of the Balsams, I am convinced that the application of materials subservient to the highest possible effects of cultivation must answer a two-fold purpose, mechanical and nutritive, (or assimilative), and that the amount of material subservient to the latter purpose should only be in proportion to the progressively absorbent and digestive functions of each plant. I would even apply these views to the cultivation of such plants as are exposed to the most intense agencies ; for this reason, that the amount of material equal to a given effect would be in proportion to the former—the more powerful the agent, the greater the amount of material, a plant could operate upon ; and the greater the amount of material, the more essential that its qualities, proportions, arrangement, &c., should be rendered subservient to the progressive stages of growth. I think it is by what I venture to call a mechanical medium that the law of gravitation operates, and it is the uniform operation of this law which constitutes the capability and power of uniform agency in all material bodies.

“ It will also be necessary when fruit of the largest size is required, to place the plants at all periods of their growth at considerable distances from each other, because the leaves of the Pine-Apple plant act less efficiently in the generation of sap in proportion as they are made to take a perpendicular direction, and the direction they are compelled to take when they are laterally much shaded—for the leaves of this plant, like the stems of Potato-plants, are subjected to the conflicting influence of gravitation and of light—the one labouring to give a perpendicular, and the other a horizontal direction to the leaves ; and the comparative power of one agent increasing as that of the other decreases.”

Remarks.—The above very instructive observations appear to inculcate the great importance of equalising the great opposing powers in Nature, and serve to afford the last confirmatory evidence in support of an opinion I have given in a previous paper on the essential importance of “ a uniform circulation of moisture,” as a principal medium by which the highest possible effects in cultivation are to be attained. As this condition will, ere this, have excited some little attention, and in some instances conjecture, as to the causes which operate to produce it, I beg to submit the following proposition to the consideration of cultivators:—

A uniform circulation of the fluids necessary for the highest objects in Horticulture is the result of adapting the arrangement, proportions, textures, and qualities of the materials employed in cultivation, to the organic structure of plants, and the external agencies which operate upon them.—
WILLIAM WOOD.—*Gardener's Chronicle*, for Nov. 1843.

*General Catalogue of Plants in the Honourable Company's Botanic
Garden, Calcutta.*

ACOTYLEDONES

ACOTYLEDONES,—Continued.

FILICES.

CHARACT.

Acrostichum flagelliferum.
 „ *emarginatum*
 „ *dimorphum*
Polypodium glabrum
 „ *quercifolium*
 „ *prolifera*
 „ *altissimum.*

Clusia involucriata.
Crotalaria

MONOCOTYLEDONES

SCITAMINEÆ.

Antrophyum sp.
Hemionitis cordifolia.
Pteris lanulata.
 „ *scandens*, X
 „ sp.
Davallia multiflora, X
 „ sp.
Lygodium bicolor.
 „ *microphyllum*
 „ sp.
Ophioglossum flexuosum.
 „ *cordifolium*, X

Zingiber officinale
 „ *Zerumbet*, X †
 „ *pardochelium*, †
 „ *Cassumunar*, X †
 „ *ligulatum*, †
 „ *rubescens*, †
 „ *squarrosum*, X †
 „ *panduratum*, X †
 „ *capitatum*, †
 „ *guttulatum*, †
 „ *elatum*, † X
 „ *barbatum*, †

MARSHACEÆ.

Marsilea quadrifolia.

Cucuma zedoaria, †
 „ *plicata*, †
 „ *zerumbet*, †
 „ *zanthorrhiza*, X †
 „ *cordata*, †

SALVINIACEÆ.

Salvinia cucullata
 „ *umbricata.*
 „ *verticillata*

clata, † X
 „ *glaucophylla*, †
 „ *coesia*, †
 „ *attenuata*, X †
 „ *parviflora*, †

Azolla pinnata.

rubescens, †
 „ *comosa*, X †
 „ *grandiflora*, †

MUSCÆ.

Tortula indica.

leucorrhiza, X †
 „ *angustifolia*, †

EQUISETÆ.

Equisetum debile, X

„ *longa*, †
 „ *Amada*, †
 „ *montana*, X †

X Signifies plants in the Distribution Nursery.

† Plants which ripen seed in the Botanic Garden.

SCITAMINEÆ.

<i>Curcuma</i>	<i>latifolia</i> , ‡
„	<i>reclinata</i> , × ‡
„	<i>ornata</i> , ‡
„	<i>cordifolia</i> , ‡
„	<i>eruginosa</i> , ‡
„	<i>ferruginea</i> , ‡
<i>Hitchemia</i>	<i>glauca</i> , × ‡
<i>Kæmpferia</i>	<i>Galanga</i> , ‡
„	<i>Roscoeana</i> , × ‡
„	<i>rotunda</i> , × ‡
„	<i>elegans</i> , × ‡
„	<i>angustifolia</i> , × ‡
„	<i>parviflora</i> , ‡
„	<i>pandurata</i> , ‡
„	<i>ovalifolia</i> , ‡ ×
„	<i>marginata</i> , × ‡
<i>Anomum</i>	<i>dealbatum</i> , × ‡
<i>Hedychium</i>	<i>canneum</i> , ‡
„	<i>angustifolium</i> , × ‡
„	<i>fastigiatum</i> , ‡
„	<i>spicatum</i> , ‡
„	<i>Gardnerianum</i> , ‡
„	<i>acuminatum</i> , ‡
„	<i>sulphureum</i> , ‡
„	<i>flavescens</i> , ‡
„	<i>ellipticum</i> , ‡
„	<i>giganteum</i> , ‡
„	<i>elatum</i> , ‡
„	<i>coccineum</i> , ‡
<i>Alpinia</i>	<i>Galanga</i> , ‡
„	<i>Allughas</i> , ‡
„	<i>bracteata</i> , ‡
„	<i>nutans</i> , ‡
„	<i>calcarata</i> , ‡
„	<i>porrecta</i> , ‡ ×
<i>Hellenia</i>	<i>cærulea</i> .
<i>Gastrochilus</i>	<i>pulcherrimus</i> .
„	<i>affinis</i> .
„	<i>Jenkinsoni</i> .
<i>Phæomeria</i>	<i>magnifica</i> .
<i>Costus</i>	<i>speciosus</i> , ‡
„	<i>nepalensis</i> , ‡
„	<i>argyrophyllus</i> , × ‡
<i>Globba</i>	<i>marantina</i> , × ‡
„	<i>extensa</i> , × ‡
„	<i>bracteolata</i> , × ‡
„	<i>Careyana</i> , × ‡
<i>Mantisia</i>	<i>saltatoria</i> .
<i>Scitaminea</i>	<i>indeterminata</i> .

CANNÆÆ.

<i>Phrynium</i>	<i>dichotomum</i> , ×
„	<i>bicolor</i> , ×
„	<i>zebrinum</i>
„	<i>setosum</i> .
„	<i>cylindricum</i> .
„	<i>imbricatum</i>
„	<i>capitatum</i> , ×
„	<i>parviflorum</i> .
<i>Maranta</i>	<i>arundinacea</i> , ×
„	<i>ramosissima</i> , ×
<i>Canna</i>	<i>Lamberti</i> , × ‡
„	<i>indica</i> , × ‡
„	<i>speciosa</i> , × ‡
„	<i>glauca</i> , × ‡
„	<i>coccinea</i> , ‡
„	<i>discolor</i> , × ‡
„	<i>flaccida</i> , × ‡
„	<i>flavescens</i> , ‡
„	<i>pallida</i> , ‡

MUSACÆÆ.

<i>Heliconia</i>	<i>baccinata</i> , ×
<i>Strelitzia</i>	<i>angusta</i>
„	<i>purpurea</i> .
<i>Musa</i>	<i>Sapientum</i> .
„	<i>paradisica</i> , ×
„	<i>coccinea</i> , ×
„	<i>ornata</i> , ‡
„	<i>superba</i> , ‡
„	<i>textilis</i> , ×
„	<i>glauca</i> , × ‡
„	<i>culina</i> , ×
„	<i>Cavendishii</i> , ×
<i>Ravenala</i>	<i>madagascariensis</i> , ‡

AMARYLLIDÆÆ.

<i>Curculigo</i>	<i>orchnoides</i> , ×
„	<i>recurvata</i> ,
„	<i>sumatrana</i> , ×
<i>Hypoxys</i>	<i>ovata</i> .
<i>Alstremeria</i>	<i>pulchella</i> .
<i>Fourcroya</i>	<i>tuberosa</i> , × ‡
<i>Agave</i>	<i>Cantala</i> , × ‡
„	<i>lurida</i> , × ‡
„	<i>verrucosa</i> , ‡
„	<i>americana</i> , ‡
<i>Doryanthes</i>	<i>excelsa</i> .

AMARYLLIDÆA, —Continued.

AMARYLLIDÆA, —Continued.

<i>Sprekelia Dalhousiei</i> , X	<i>Amaryllis Belladonna</i> .
„ <i>formosissima</i> , X	„ <i>vittata</i> .
<i>Hippeastrum ambiguum</i> , X ‡	„ <i>longifolia</i> .
„ <i>stylosum</i> , X	„ <i>aurea</i> .
„ <i>equestre</i> v. <i>magus</i> , X	„ <i>coryneensis</i> .
„ „ <i>semplenium</i> ,	„ <i>aulica</i> .
„ <i>longe-pedunculatum</i>	„ <i>pulverulenta</i> .
„ <i>spathaceum hybridum</i>	„ <i>fulgens</i> .
„ <i>rutile—Johnsoni</i> .	<i>Craium amaranthum</i> , X
„ <i>pulverulentum</i>	„ <i>erubescens</i> masson-capense
„ <i>Johnsoni</i> .	„ <i>deflexum</i> , X ‡
„ <i>reticulatum</i> X ‡	„ <i>scaberrima</i>
„ ——— var. <i>striatifolium</i>	„ <i>zeylanicum</i> , X
„ <i>vittatum</i> .	„ „ <i>capense</i> —goven
„ <i>bulbosum</i> var. <i>rufum</i>	„ <i>portense</i> var. <i>longifolium</i> , X
„ <i>regine—hybridum</i> .	„ <i>portense</i> var. <i>longifolium</i>
„ <i>abvenum</i> .	„ <i>rubescens</i> —capense
„ <i>fulgidum</i> .	„ <i>brevifolium</i> .
<i>Habranthus tubispatha</i> , X ‡	„ <i>careyanum</i> X
„ <i>rupestris</i> , ‡	„ <i>canaliculatum</i>
„ <i>spathaceus</i> , X	„ <i>canaliculatum</i>
<i>Zephyranthes grandiflora</i>	„ <i>australe</i> var. <i>peruviana</i>
„ <i>candida</i> , ‡	„ <i>amabile</i> , X
„ <i>cristata</i> , X	„ <i>rigidum</i> .
„ <i>rosea</i> , X ‡	„ <i>toxicarium</i> , X ‡
<i>Coburgia variegata</i> .	„ <i>mauritanum</i> .
<i>Pancratium zeylanicum</i>	„ <i>nervosum</i>
„ <i>longiflorum</i> .	„ <i>procerum</i> , X
„ <i>biflorum</i> .	„ <i>angustum</i> , X
„ <i>triflorum</i>	„ <i>speciosum</i> , X
„ <i>maritimum</i> X	„ <i>ornatum zeylanicum</i>
„ <i>glacium</i> .	„ ——— <i>speciosum</i> .
„ <i>carolinianum</i>	„ ——— <i>Careyanum</i>
„ <i>caribceum</i> , X	„ ——— <i>Herbertianum</i>
„ <i>americanum</i> .	„ <i>capense</i> .
<i>Hymenocallis fragrans</i> v. <i>speciosa</i>	„ ——— v. <i>ruparium</i> .
„ <i>caribcea</i> , X	„ <i>moluccanum</i> , X
„ <i>tinuiflora</i> , X	„ <i>Goveanum</i> .
„ <i>amena</i>	„ <i>Loddigesi</i> .
„ <i>angusta</i>	<i>Brunsvigia utungensis</i>
„ <i>rotata</i> .	„ <i>falcata</i>
<i>Ismene calathina</i> , X	<i>Nerine venusta</i> .
<i>Eurycles ambomensis</i> , X	„ <i>undulata</i> .
<i>Calostemma luteum</i> .	„ <i>stellata</i> .
<i>Hemeranthus pubescens</i> .	
<i>Amurocharis coranica</i> v. <i>pallida</i> .	
<i>Amaryllis regine</i>	
„ <i>equestis</i> .	
„ <i>pulcherrima</i> .	

LACCÆLÆ.

<i>Laccæla aspera</i> , ‡
„ <i>pinnatifida</i> , ‡
„ <i>lævis</i> .

IRIDEÆ

Gladiolus sp. , ,
 „ „
 „ „
Ixia sp.^{*}
 „ „^{*}
 „ „

Pardanthus chinensis, × †

Iris morœoides, †

„ *chinensis*, ×

„ *stenopetala*.

„ *stenogyna* ?

„ *hungarica*, ×

„ *nepalensis*, ×

Cipua paludosa, ×

„ *plicata*.

„ *Northiana*. ×

„ *brasilensis*

„ *humilis*.

Ferraria undulata.

„ *Ferrariola*

BROMELIACEÆ.

Bromelia Ananas, ×

„ *bracteata*, †

„ *humilis*, †

„ *sylvestris*, × †

„ *Karottas*, × †

„ sp.

„ sp.

Bilbergia bicolor.

„ *pyramidalis* v. *bicolor*.

„ *zebrina*.

„ *humilis*, ×

„ *iridifolia*, ×

Pitcairnia integrifolia, ×

„ *bromelifolia*, ×

„ *latifolia*.

„ *staminea*.

„ *bracteata*.

Tillandsia amœna.

„ *acaulis*.

„ sp.

HYDROCHARIDETÆ.

Valisneria octandra †

HYDROCHARIDETÆ,—Continued

Valisneria alternifolia, †

„ *verticillata*, †

Damasonium indicum, †

ORCHIDETÆ.

Pleurothallis ophiocephala.

„ *racemiflora*.

Physosiphon Loddigesii.

Octomeria graminifolia.

„ *Loddigesii*,

Oberonia iridifolia.

Liparis cylindrostachya. ×

Otochilus fusca, ×

Pholidota imbricata, ×

„ *pallida*.

„ *articulata*, ×

Coelogyne cristata, ×

„ *elata*, ×

„ *nitida*, ×

„ *decora*, ×

„ *barbata*, ×

„ *media*, ×

„ *undulata*, ×

„ *flavida*, ×

„ *lumbriata*.

„ *rigida*, ×

„ *præcox*, ×

Megachilium falcatum.

Bolbophyllum recurvum.

„ *cocoinum*.

„ *umbellatum*, ×

„ *Careyanum*, ×

„ *leopardinum*, ×

„ *fuscescens*.

„ *serpens*.

„ *auricomum*.

Cirropetalum Lindleyi.

„ *vaginatum*.

Eria flava, ×

„ *stellata*.

„ *carinata*,

„ *Jenkinsii*, ×

„ *planicaulis*, ×

(*Agrostophylli* sp.)

„ *densiflora*, ×

„ *clavicaulis*.

ORCHIDÆ,—Continued.

• ORCHIDÆ,—Continued.

Aporum cuspidatum, X

,, anceps.

Polystachya lutea

Dendrobium Pierardii, X

,, multicauli, X

,, uncinatum.

,, villosulum.

,, ceruleum.

,, Jenkinsii, X

,, longicorne, X

,, aggregatum, X

,, moschatum, X

,, calceolare, X

,, emulum.

,, cucullatum, X

,, formosum, X

,, Dalhousianum, X

,, unguiculatum.

,, chrysanthum, X

,, densiflorum, X

,, heterocarpum, X

,, amœnum.

,, secundum

,, carinulatum, X

,, crumenatum.

Epidendrum ellipticum

,, clavatum.

,, nutans.

,, crassifolium.

,, fuscum.

,, cochleatum.

,, ciliatum.

,, umbellatum.

,, fragrans.

,, Harrisonianum

,, nocturnum.

,, ciliare.

,, sp.

Brassavola cucullata.

,, trinervis.

Lachia autumnalis.

,, Barkeriana.

,, anceps.

Cattleya Forbesii.

,, Mossii v. superba.

,, citrina.

,, crispa.

Broughtonia speciosa.

Spathoglottis violacea

Bletia verecunda

,, florida.

,, hyacinthina.

Arundina bambusifolia, X

Phajus Wallichii, X

,, Tankervilleæ, X

,, albus, X

Acropsis javanica.

Maxillaria densa.

,, rutescens.

,, decolor.

,, aromatica.

,, punctata.

,, squalens

,, rupestris.

,, Barringtoniæ

,, Harisoniæ

,, aurantiacea.

,, Parkeri.

,, picta.

,, nitidiflora

,, tetragona.

,, parvula.

,, sp.

Batemanina Colleyi.

Catasetum luridum.

,, tridentatum.

,, pallidum.

,, sp.

,, sp.

Dicerpys Baueri.

Monachanthus viridis.

,, discolor v. viridiflorus.

Peristeria elata.

Cymbidium marginatum

,, giganteum, X

,, Mastersii, X

,, aloifolium, X

,, lancifolium, X

,, triste.

Acropera Loddigesii.

Grammatophyllum Finlaysonianum.

Geodorum dilatatum.

,, pallidum.

Eulophia fusca.

,, exaltata.

Zygopetalum Mackai.

,, squalens.

Cyrtopodium Andersonii.

ORCHIDE L.

Cyrtopodium cupreum.
Cyrtopera flava, ×
 „ *plicata*, ×
Rodriguezia planifolia.
 „ *secunda*.
Oncidium luridum.
 „ *Baüerianum*
 „ *sybillatum*.
 „ *Lanceanum*.
 „ *Papilio*.
 „ *ampliatum*.
 „ *altissimum*.
 „ *carthagimense*
 „ *sp.*
 „ *sp.*
Brassia Lanceana.
 „ *maculata*.
 „ *candida*.
 „ *sp.*
Vanda cristata, ×
 „ *Roxburghii*, ×
 „ *teres*, ×
 „ *multiflora*, ×
Renanthera coccinea, ×
Camarotis purpurea, ×
Appendicula javanica.
Saccolabium guttatum, ×
 „ *rigidulum*
 „ *pallens*, ×
 „ *suaveolens*.
 „ *papillosum*, ×
 „ *carinatum*
 „ *denticulatum*, ×
 „ *macranthum*, ×
Saccanthus oxyphyllus
 „ *affinis*.
 „ *pallidus*.
Acerides odoratum, ×
 „ *affine*, ×
 „ *refractum*
Ceecoclades maculata
Augræcum Richardianum.
 „ *subulatum*.
 „ *carneum*.
Gongora atropurpurea.
 „ *maculata*.
Stanhopea insignis.
 „ *grandiflora*.
 „ *eburnea*

ORCHIDE V.

Stanhopea oculata
Centrosia corymbosa.
Habenaria commelinifolia.
Platanthera decora.
 „ *Susanne*.
Pterogodium sulcatum, ×
Pogonia plicata, ×
 „ *viridiflora*, ×
Neottia procera, ×
Hæmaria discolor.
Cypripedium venustum
Arethusa benghalensis.
Vanilla aromatica, ×
 „ *planifolia*, ×
Ornithocheilus striatulus.
 About 21 other species unnamed.

PALM L.

Chamedorea elegans.
Thrinax pumila.
Sabal blackburianum
 „ *barbosum* [?]
 „ *Adansonii*, × ⁺
Licuala spinosa, × [†]
 „ *peltata*, × [†]
Rhapis flabelliformis, ×
Chamærops Martiana, ×
 „ *humilis*.
 „ *khasiyana*
Livistona mauritiana, × [†]
Corypha elata.
 „ *Tabera*
Corypha umbraculifera, ×
 „ *austalis*.
Phoenix dactylifera.
 „ *sylvestris*, ×
 „ *paludosa*, ×
 „ *farinifera*.
 „ *acaulis*, ×
 „ *lyroensis*.
Calamus Rotang.
 „ *fascicularis*, ×
 „ *extensus*.
 „ *hostilis*.
Zalacca edulis.
 „ *assamica*.
Sagus Rumphii.
Borassus flabelliformis.

PALMÆ,—Continued.

SMILACINEÆ,—Continued.

Latania borbonica.
Hyphæne coriacea.
Arecæ Catechu.
 borbonica v. *alba*, ✕
 triandra, ✕ †
 oleracea.
 lutescens, ✕
 sp.
Utrina caryotoides, ✕ †
Caryota uienis, ✕ †
 sobolifera
 mitis, ✕ †
Arenga saccharifera, ✕ †
Cocos nucifera, †
 flexuosa.
 diffrondosa
Desmoncus polyacanthus
Bactris ciliosa.
Eleis guineensis
Oreodoxa regia.
Nipa fruticans, †
 and
 Seven undetermined species.

PONTEDERÆÆ

Pontedera vaginalis, †
 plantaginæa, †

LILIACEÆ.

Gloriosa superba, ✕
Lilium longiflorum, †
Fritillaria Thomsoniana,
Tulipa Clusiana, †

SMILACINEÆ

Hemerocallis cordata.
 flava.
Agapanthus umbellatus.
Polyanthes tuberosa, ✕
Veltheimia viridiflora.
Allium fragrans, †
 sativum, †
 Cepa, †
 tuberosum, ✕ †
 nuttans, †
 spuale, †

Ledebouria hyacinthina.
Scilla coronandæ hania.
 indica, †
Ornithogalum pinifolium.
 caudatum, †
Dionis lanceaefolia.
 media.
Eucornis undulata.
Anthericum tuberosum, †
 Nimmonii.
 vespertinum, ✕
Asphodilus fistulosus
Tulbaghia violacea.
Ophiopogon Wightianus, †
 japonicus, ✕
Ptilostyles petiolaris.
 viridiflora, ✕
Asparagus officinalis.
 acerosa.
 racemosa, ✕ †
 ethiophagus.
Dianella ensifolia, †
 nemorosa, ✕ †
Draconia angustifolia, †
 ensiformis.
 ferrea, ✕ †
 arboorea.
 terminalis, ✕
 brazilensis.
 umbraculifera.
 spicata, ✕
 maculata, ✕ †
 australis.
 reflexa, ✕ †
 cernua.
 plicata.
 stricta.
 Helferiana, ✕
 marginata.
Sansevieria zeylanica, ✕ †
 sessiliflora, ✕ †
Yucca glauca, †
 aloifolia, ✕
 superba, †
 serrulata.
 gloriosa, ✕
 filamentosa.
 ferruginea.
Xanthorrhoea hastilis

SMILACINEÆ, —Continued.

ALISMACEÆ.

- Eustrephus angustifolius*, × ‡
Lomatophyllum macrum, ‡
 „ *borbonicum*, ‡
Aloe *barbadensis*, × ‡
 „ *obscura*, ×
 „ *attenuata*.
 „ *abyssinica*.
 „ *intermedia*
 „ *purpurascens*.
 „ *saponaria*, ×
 „ *arborescens*, ×
 „ *coarctata*.
 „ *humilis*
 „ *ferox*.
 „ *Commelina*.
 „ *foliosa*.
Smilax *latifolia*, ‡
 „ *myrtenensis*.
 „ *quadrangularis*, ‡
 „ *maculata*, ×
 „ *Saisaparilla*.
 „ *anceps*.
 „ *macrophylla*, ‡
 „ *stipulacea*, ‡
 „ *prolifera*, ‡
 „ *ovalifolia*, × ‡
 „ *laurifolia*, × ‡
 „ *lanceifolia*, ‡
 „ *baccillaris*, ×
Tupistra *nutans*, × ‡
 „ *angustifolia*, × ‡
 „ *aurantiacea*.

COMMELINEÆ.

- Commelina communis*, ‡
 „ *benghalensis*, ‡
 „ *salsifolia*, ‡
 „ *nudiflora*, ‡
 „ *ionasma*? ‡
Tradescantia *discolor*, × ‡
 „ *virginiana*, ‡
 „ *fuscata*.

BUTOMEÆ.

- Butoia* *umbellatus*

- Sagittaria verticillata*, ‡
 „ *obtusifolia*, ‡
 „ *sagittifolia*, ‡
Alisma *Plantago*, ‡

JUNCÆ.

- Flagellaria indica*, × ‡

DIOSCOREÆ.

- Dioscorea globosa*, ‡
 „ *alata*, ‡
 „ *rubella*, ‡
 „ *purpurea*, ‡
 „ *aculeata*, ‡
 „ *fasciculata*, ‡
 „ *angusta*, ‡
 „ *nummularia*, ‡
 „ *glabra*, ‡
 „ *Damonum*, ‡
 „ *pentaphylla*, ‡
 „ *Deppeana*, ‡

PANDANÆ.

- Pandanus moschatus*, ×
 „ *lucidus*, ‡
 „ *gratissimus*.
 „ *Melori*, ‡
 „ *amaryllidifolius*, ×
 „ *crassipes*, ‡
 „ *Candelabrum*, ‡
 „ *dubius*, ‡
 „ *fetidus*, × ‡
 „ *furcatus*, × ‡
 „ *utilis*, × ‡
 „ *sp.*

AROIDÆ.

- Pistia* *Stratiotes*, ‡
Ambrosia *spiralis*, ‡
 „ *ciliata*, ‡
Arum *Colocasium*, ‡
 „ *viviparum*.
 „ *indicum*, ‡
 „ *odorum*,

AROIDÆ.—Continued.

- Atum prælongum.*
 „ *cucullatum.*
 „ *formicatum*, ‡
 „ *flagelliferum*, ‡
 „ *divaricatum*, ‡
 „ *orixense*, ‡
 „ *trilobatum*, × ‡
 „ *sessiliflorum.*
 „ *campanulatum*, ‡
 „ *bulbiferum*, ‡
 „ *margaritiflorum*, × ‡
 „ *gibbosum.*
 „ *furturaceum*
 „ *apertum*
 „ *sinuosum*, ‡
 „ *punctatum.*
 „ *esculentum*, ‡
 „ *marginatum*, ‡

Dracontium triphyllum.

Caladium pictum.

Saurum guttatum.

Philodendron crassifolium.

Calla virosa

- „ *oblongifolia*
 „ *calyptrata.*
 „ *aromatica*, ×
 „ *picta.*

Pothos caudata.

- „ *scandens*, × ‡
 „ *officinalis.*
 „ *acaulis.*
 „ *Harnisi.*
 „ *segetifolia.*
 „ *Deppii.*
 „ *obliqua.*
 „ *cannifolia.*
 „ *cordata*, ×
 „ *gigantea*, ×
 „ *decursiva.*
 „ *pinnata.*
 „ *sagittata.*

Lasia aculeata, ‡

Acorus Calamus, ×

„ *gramineus*, ×

LEMNACEÆ.

Lemna orbiculata.

LEMNÆ.—Continued.

Lemna globosa.

„ *crucata.*

ROXBURGHACEÆ

Roxburghia viridiflora, × ‡

TYPHACEÆ.

Typha elephantina

„ *angustifolia*

Najas

Potamogeton pectus, ‡

„ *tuberosus.*

GRAMINEÆ.

Poa chinensis, ‡

„ *cynosuroides*, ‡

„ *diandra*, ‡

„ *nutans*, ‡

„ *plumosa*, ‡

„ *multiflora*, ‡

„ *uneloides*, ‡

„ *gangetica*, ‡

Festuca nutans.

Aelu filiformis, ‡

Eleusine Coracana, ‡

„ *stricta*, ‡

„ *egyptiaca*, ‡

„ *indica*, ‡

„ *verticillata*, ‡

„ *calycina*, ‡

Arundo Karka.

„ *Donax v. versicolor.*

Melica latifolia, ‡

Andropogon serratus, ‡

„ *tenellus*, ‡

„ *conjugatus*, ‡

„ *filiformis*, ‡

„ *scandens*, ‡

„ *aciculatus*, ‡

„ *punctatus*, ‡

„ *muricatus*, ‡

„ *glaber*, ‡

„ *bicolor*, ‡

„ *Surdum*? ‡

GRAMINEÆ,—Continued.

Andropogon saccharatus, ‡
 „ *laxus*, ‡
 „ *Ischœmum*, ‡
 „ *Nardus*, ‡
 „ *halepensis*, ‡
 „ *Schœnanthus*, X ‡

Anthistria ciliata.
 „ *polystachya*
 „ *arundinacea*, ‡

Saccharum cylindricum.
 „ *spontaneum*, ‡
 „ *fuscum*
 „ *semidecumbens*.
 „ *canaliculatum*
 „ *Officinæ*.
 „ *chinense*.
 „ *procerum*.
 „ *Sara*

Rottboellia perforata.

Manisuris granularis, ‡

Panicum spicatum.

„ *glaucum*.
 „ *holcoides*.
 „ *interruptum*.
 „ *Dactylon*.
 „ *ellipticum*.
 „ *ciliare*.
 „ *cimicinum*
 „ *corymbosum*.
 „ *brizoides*.
 „ *fluitans*.
 „ *lanceolatum*.
 „ *stagninum*.
 „ *Colonum*.
 „ *cuspidatum*.
 „ *setigerum*
 „ *repens*.
 „ *hirsutum*.
 „ *verticillatum*.
 „ *italicum*.
 „ *strictum*.
 „ *hispidulum*
 „ *frumentaceum*.
 „ *tenellum*.
 „ *paludosum*.
 „ *uliginosum*.
 „ *sarmentosum*
 „ *miliare*
 „ *melicoides*.

GRAMINEÆ,—Continued.

Paspalum, sp.
Bambusa arundinacea
 „ *gigantea*, X
 „ *stricta*.
 „ *Tulda*.
 „ *Balcoora*.
 „ *baccifera*.
 „ *spinosa*.
 „ *nana*, X

CYPERACEÆ.

Cyperus dubius.
 „ *monophyllus*.
 „ *compressus*.
 „ *difformis*.
 „ *rotundus*.
 „ *incurvatus*.
 „ *tortuosus*.
 „ *tenuiflorus*.
 „ *Iria*.
 „ *elongatus*.
 „ *Pingori*
 „ *elatus*.
 „ *verticillatus*
 „ *distans*
 „ *tegetus*.
Scirpus tuberosus.
 „ *plantagineus*.
 „ *acicularis*.
 „ *bispicatus*.
 „ *ischœmoides*.
 „ *squarrosus*.
 „ *diphyllus*.
 „ *complanatus*.
 „ *tetragonus*.
 „ *quinguangularis*.
 „ *anceps*.
 „ *Kysoor*.
Kyllinga monocephala.
 „ *umbellata*.
Carex muricata, X
 „ sp.
Clematis Viticella.
 „ *flammea*, X
 „ *Gouriana*, X ‡
 „ *cylindrica*, ‡
 „ *grata*.
 „ *integrifolia*.

CYPARACEÆ, —Continued.

Clematis Cadmia †
Naravelia zeylanica, †
Thalictrum foliolosum.
 „ *elatum*.
Anemone nipalensis.
Knowltonia grandifolia †
Nigella indica, †
Delphinium Ajacis, †

PAPAVERACEÆ.

Papaver somniferum, †
Argemone mexicana, †

NYMPHÆACEÆ

Euryale ferox
Nymphæa alba.
 „ *Lotus*, †
 „ *versicolor*
 „ *cyanea*, †
 „ *esculenta*, †
 „ *stellata*, †

NELUMBONÆÆ

Nelumbium speciosum, †

MYRISTICÆÆ

Myristica moschata, †

MAGNOLIACEÆ.

Michelia Champaca, †
 „ *Doltsopa*, †
Magnolia grandiflora.
 „ *pumila*.
 „ *fuscata*.
Liriodendrum grandiflorum
 „ *liliflorum*.
Magnoliacea.

ANONACEÆ.

Anona squamosa, × †
 „ *reticulata*, × †
 „ *muricata*, × †
 „ *Cherimoli*, × †
Uvaria undulata, × †

ANONACEÆ, —Continued.

Uvaria odorata, × †
 „ *ventricosa*, × †
 „ *sesquipedalis*, ×
 „ *purpurea*, × †
 „ *bicolor*, ×
 „ *macrophylla*, × †
 „ *bracteata*.
 „ *rufa*.

Gutteria cerasoides, ×

„ *suberosa*, †
 „ *longifolia*, × †
 „ *volubilis*, × †
 „ *Badajamba*, × †
 „ *fasciculata*, × †
Unona *longiflora*, × †

„ *thamasa*, †
 „ *penduliflora*.
 „ *laevigata*
 „ *clasymoschato*
 „ *pedunculata*

Artabotrys densiflora

„ *odoratissima*, × †

Hyalostemma Roxburghi, × †

Kadsura japonica

DILLENIACEÆ

Dellima hebecarpa

„ *odorata*.

Wormia dentata, × †

Dillenia augusta, × †

„ *speciosa*, × †

„ *scabrella*, × †

Colbertia coromandeliana, †

UMBELLIFERÆ

Anethum fœniculaceum

„ *Panmorium*.

Coriandrum sativum, †

Panax cochleatum, †

„ *digitatum*.

„ *suffruticosum*, ×

„ *fragrans*, ×

„ *aculeatum*, ×

Hedera floribunda.

Aralia nodiflora, ×

„ *digitata*.

„ *umbiculifera*, ×

ARALIACEÆ,—Continued.

Aralia obovata †
Sciodaphyllum pulchellum,

ESCALLONIEÆ

Itea macrophylla.

BERBERIDEÆ.

Berberis asiatica, ×
Nandina domestica, ×

AMPELIDEÆ.

Cissus glauca, × †
 „ *quadrangularis*, †
 „ *femina*, †
 „ *elongata*, †
 „ *auriculata*, × †
 „ *latifolia*, †
 „ *lanceolaria*, × †
 „ *pedata*, †
 „ *carnosa*, †
 „ *vitiginea*, †
 „ *vinifera*, †
 „ *indica*, †
 „ *bracteolata*, ×
 „ *capensis*, ×
 „ *glaberrima*, ×
Leca macrophylla, † †
 „ *sambucina*, †
 „ *Staphylea*, †
 „ *hirta*, †
 „ *crispa*, × †
 „ *parallela*, †
 „ *sanguinea*, †

PITTOSPOREÆ.

Pittosporum Tobira.
 „ „ *v. variegatum*, ×
 „ *ferrugineum*.
 „ *undulatum*.
 „ *verticillatum*, †

OLACINEÆ.

Olaæ scandens, † †
 „ *imbricata*

OLACINEÆ,—Continued.

Balanites ægyptiaca, †
Gomphandra axillaris.

ONAGRARIÆ.

Fuchsia sp.
 „ sp.
 „ sp.
Ceanotha stricta, †
 „ *mollissima*, †
 „ *triloba*, †
 „ *tetrapetala*, †
 „ *odorata*, †
 „ *rosea*, × †
 „ *grandiflora*, †
Jussiaea repens, †
 „ *villosa*, †
Trapa bispinosa, †

HALORAGÆ.

Myriophyllum verticillatum, †
 „ *tuberculatum*, †
Serpicula verticillata, †

COMBRETACEÆ.

Terminalia Catappa, × †
 „ *procera*, × †
 „ *Fatoua*, × †
 „ *Bellerica*, × †
 „ *Chebula*, × †
 „ *angustifolia*, × †
 „ *citrina*, × †
 „ *Benzoin*, †
 „ *oblonga*, †
Pentaptera tomentosa, †
 „ *Arjuna*, × †
 „ *glabra*, †
 „ *bialata*, × †
 „ *paniculata*, × †
Getonia nutans, × †
Conocarpus latifolia, †
 „ *acuminata*, †
Poirroa pilosa, × †
 „ *coccinea*, ×
 „ *Roxburghii*, × †
 „ *densiflora*.
Combretum decandrum, †

COMBRETACEÆ,—Continued.

- Combretum chinense, X
 „ extensum, X
 „ acuminatum, X †
 „ costatum, X †
 „ bullatum.
 „ comosum
 „ Wightianum, †
 Quisqualis indica, X †
 Lummitzera racemosa

ALANGIÆ.

- Alangium decapetalum, X †
 Marlea begonifolia, X †

RHIZOPHORÆ.

- Rhizophora gymnorhiza, †
 „ decandra.
 Caralhia lucida, X †
 „ lanceæfolia, X †

MEMECYLÆ.

- Memecylon capitellatum, X †
 „ tinctorium, X †

MELASTOMACEÆ.

- Melastoma erythrophyllum.
 „ sp.
 „ sp.
 Arthrostemma lineatum.

MYRTACEÆ.

- Tristania megaphylla.
 Melaleuca Leucadendron, †
 „ Cajuputi, †
 „ nodosa.
 „ sp.
 Eucalyptus resinifera.
 Callistemon lophanthum.
 „ lineare.
 „ pinnifolium.
 „ lanceolatum.

MYRTACEÆ—Continued.

- Metrosideros verus, X
 „ linearis, †
 Psidium pommerum, †
 „ polycarpon, †
 „ pyriferum, X †
 „ Cujavillus, X †
 „ guineense, X †
 „ Cattleyanum.
 Jossima revoluta
 „ buxifolia.
 „ elliptica.
 Myrtus communis, X
 „ califlora.
 „ tomentosa.
 „ Filamenta, X †
 Syzygium balsameum, X
 „ oleum.
 „ nervosum, X †
 „ glomeratum
 „ fruticosum, †
 „ myrtifolium, X †
 „ inophyllum, †
 „ tetragonum, †
 Caryophyllus aromaticus.
 Eugenia Jambolana, X †
 „ cymosa, X †
 „ grata, †
 „ ximeniflora, †
 „ lanceæfolia, †
 „ buxifolia.
 „ pulchella, X †
 „ bœaria, †
 „ bracteata, X
 „ brasiliensis.
 Jambosa malaccensis, X †
 „ purpurea, X †
 „ polypetala, X †
 „ ternifolia, X †
 „ alba, X †
 „ vulgaris, X †
 „ decora, †
 „ aquea, X †
 Careya spherica, †
 „ herbacea, †
 „ arborea, †
 Barringtonia speciosa, X
 „ acutangula, X †
 „ racemosa, X †
 Fœtidia mauritiana, X

GRANATEÆ.

- Punica Granatum*, × ‡
 „ *nana*, ‡

PHILADELPHÆÆ.

- Philadelphus coronarius*.
Deutzia scabrella,

CORNEÆ.

- Cornus macrophylla*, ×
 „ *oblonga*, ×

LORANTHACEÆ.

- Loranthus bicolor*, ‡
 „ *globosus*, ‡

CUCURBITACEÆ.

- Cucumis trigynus*, ‡
 „ *Colocynthis*, ‡
 „ *Melo*, ‡
 „ *sativus*, ‡
 „ *Momordica*, ‡
 „ *utilissimus*, ‡
 „ *turbinatus*, ‡
 „ *madraspatisensis*, ‡
 „ *integrifolius*, ‡
Luffa pentandra, ‡
 „ *major*, ‡
 „ *acutangula*, ‡
 „ *graveolens*, ‡
Bryonia scabrella, ‡
Trichosanthes anguina, ‡
 „ *dioica*, ‡
 „ *lobata*, ‡
 „ *palmata*, ‡
Coccinia indica, ‡
Memordica Charantia, ‡
 „ *muricata*, ‡
 „ *mixta*, ‡
 „ *umbellata*, ‡
Cucurbita Lagenaria, ‡
 „ *Pepo*, ‡
 „ *Melopepo*, ‡
 „ *Citrullus*, ‡
Zanonia clavigera, × ‡
 „ *integerrima*.

CACTEÆ.

- Mammillaria pussilla*, ×
 „ *stylata*.
 „ *erecta*.
 „ *tenuis*, ×
Melocactus comigerus.
 „ *erectus*.
Echinocactus Rhexii.
 „ *multiplex*.
 „ *tubiflorus*
 „ *laniger*.
 „ *erectus*
 „ *Scirpium*.
 „ *sp.*
Cereus trigonus.
 „ *peruvianus*, ×
 „ *grandiflorus*, ×
 „ *triangularis*,
 „ *tetragonus*, × ‡
 „ *speciosissimus*, ×
 „ *setosus*, ×
 „ *hybridus*.
 „ *Jenkinsonianus*
 „ *truncatus*, ×
 „ *candidus*.
 „ *niger*
 „ *lanuginosus*.
 „ *nycticalus*.
 „ *ciliatus*.
 „ *extensus*.
 „ *regalis*.
 „ *jamaicensis*.
 „ *anisogonus*.
 „ *tortuosus*.
 „ *mysurus*.
 „ *marinus*.
 „ *loranthoides*.
 „ *ovatus*.
 „ *brasiliensis*.
 „ *coccineus*.
 „ *malacineus*.
 „ *triqueter*.
 „ *obtusus*.
 „ *columnaris*, ×
 „ *multangularis*.
 „ *repandus*.
 „ *Deppei*.
 „ *Bonplandii*.
 „ *virens*
 „ *subrepandus*

CACTEE,—Continued.

- Cereus* *Cummingi*.
 „ *retusus*.
 „ *nobilis*.
 „ *Princeps*.
 „ *Castus minor*.
 „ *grandis*.
 „ *gracilis*.
 „ *Bidroida* ?
 „ *hexagonus*, ‡
 „ *sp.*
Opuntia *curassavica*, X
 „ *cochiniliter*, X ‡
 „ *vulgaris*, X
 „ *polycantha*.
 „ *Tuna*, X ‡
 „ *brasiliensis*, X ‡
 „ *Dillenii*, X
 „ *microdasy*.
 „ *leucacephalus*
 „ *Stapelia*.
 „ *senilis*.
 „ *chilensis*.
 „ *triacantha*.
 „ *elator*, X
 „ *spinossissima*, X
Pereskia *aculeata*, X
 „ *Bleho*, X
Rhipsalis *salicornoides*, X
Epiphyllum *latitrons*.
 „ *speciosum-rubrum*.
 „ *marginatum*.
 „ *grandiflorum-coccineum*.
 „ *Vandesi*.
 „ *Freesii*.
 „ *alatum*.
 „ *ciliare*.
 „ *Russellianum*.
 „ *Hitchinii*.
 „ *Jenkinsonii*.

HOMALINEÆ.

- Blackwellia* *spiralis*, X ‡
 „ *fœtida*, X

FICOIDEÆ

- Mesembryanthemum* *cordifolium*, X ‡

BEGONIACEÆ.

- Begonia* *argyrostigma*.
 „ *heleclifolia*.
 „ *nitida*
 „ *reniformis*, ‡
 „ *humilis*, ‡

CRUCIFERÆ.

- Sinapis* *nigra*, ‡
 „ *alba*, ‡
 „ *dichotoma*, ‡
 „ *glauca*, ‡
 „ *timida*, ‡
 „ *divaricata*, ‡
 „ *patens*, ‡
Raphanus *sativus*, ‡
Nasturtium *montanum*, ‡
Cochlearia *Armorac*.
Erucago *aspera* ? ‡

CAPPARIDEE.

- Cleome* *viscosa*, ‡
 „ *Chelidoni*, ‡
 „ *pentaphylla*, ‡
Niebuhria *linearis*.
 „ *oblongifolia*, X ‡
Cratœva *Roxburghii*, X ‡
 „ *Nurvala*, ‡
 „ *obovata*, ‡
Capparis *horrida*, X ‡
 „ *zeylanica*, ‡
 „ *sepiaria*, X ‡
 „ *aphylla*.
 „ *urephylla*.
 „ *Heyneana*.
Roydsia *suaveolens*.

RESEDACEÆ.

- Reseda* *odorata*, ‡

VIOLARIÆ.

- Viola* *cucullata*, X
 „ *suffruticosa*.
 „ *primulifolia*, X ‡
 „ *serpens*, X
 „ *odorata*, X

VIOLARIÆ,—Continued.

Ionidium suffruticosum, X ‡
Alsodeia benghalensis, ‡
 „ *Roxburghii*, X ‡

SAMYDEÆ

Casearia coriacea X
 „ *Vareca*
 „ *glabra*.
 „ *pentandra*.
 „ *glomerata*.
 „ *acuminata*.
 „ *tomentosa*.
 „ *fasciculata*.
 „ *lanuginosa*, ‡

MORINGÆÆ.

Moringa arabica, ‡

PASSIFLORÆÆ

Passiflora laurifolia, X ‡
 „ *edulis*, X ‡
 „ *quadrangularis*, X
 „ *incarnata-vat.*
 „ *fœtida*, ‡
 „ *holosericea*, ‡
 „ *minima*, X ‡
 „ *alata*.
 „ *racemosa*.
 „ *Mayana*
 „ *cœruleo-racemosa*.
 „ *lunata*, X ‡
 „ *chinensis*, X
 „ *serratifolia*, X
 „ *bicolorata*.
 „ *kermesina*, ‡
 „ *incarnato-alba*, X
 „ *Herbertiana*, X

Murucuia ocellata, X ‡

Modecca triloba.

„ *extensa*, X
 „ *palmata*, ‡
 „ *furfuracea*, X

PAPAYACÆÆ.

Carica Papaya, X ‡

FLACOURTIANÆÆ.

Flacourtia inermis, ‡
 „ *cataphracta*, X ‡
 „ *sepiaria*, ‡
 „ *cordifolia*, ‡
 „ *rotundifolia*, ‡
 „ *ferox*, ‡
 „ *Ramontchi*
 „ *sapida*, X ‡
 „ *Stigmarota*, X
Roumea chinensis, X ‡
Phoberos Roxburghii, ‡
Choulmoogra odorata, ‡
Hydnocarpus nebrisian.

TURNERACÆÆ.

Turnera trioniflora, X ‡
 „ *ulmifolia*, X ‡

BININÆÆ.

Bixa Orellana, X ‡
 „ *purpurea*, X ‡
Prockia Crucis, X
Ludia spinosa, X
 „ *fœtida*, X
Azara integrifolia, X

GUTTIFERÆÆ.

Mammea americana.
Garcinia cornea, X ‡
 „ *Cowa*, X ‡
 „ *purpurea*, X ‡
 „ *paniculata*.
 „ *pedunculata*.
 „ *Gambogia*, X ‡
 „ *lanceifolia*.
 „ *porrecta*, X ‡
 „ *celebica*.
 „ *Mangostana*.
 „ *dioica*, X ‡
Xanthochymus pictorius, X ‡
 „ *dulcis*, X ‡

GUTTIFERÆ, —Continued.

- Xanthochymus ovalifolius*, × †
Mesua ferrea, ×
Calophyllum Inophyllum, × †
 „ *Tacamahaca*.
 „ *sp.*
Canella alba, ×

HYPERICINÆ.

- Hypericum chinense*, ×
Ancistrolobus carneus, × †
 „ *eugenifolius*, †
 „ *prunifolius*.

TERNSTROMIACEÆ

- Cochlospermum gossypinum*, × †
Saurauja fasciculata.
Camellia japonica.
 „ *sp.*
Thea viridis.

ACERINÆ

- Acer oblongum*, × †
 „ *Negundo*, ×

SAPINDACEÆ

- Cardiospermum canescens*, × †
 „ *Halicacabum*, †
Paullinia carthaginensis
 „ *brasiliensis*.
Schmidelia serrata.
 „ *dentata*.
 „ *racemosa*.
Sapindus emarginatus, × †
 „ *laurifolius*.
 „ *angustifolius*.
 „ *detergens*, × †
 „ *Saponaria*, ×
 „ *rubiginosus*, ×
 „ *fruticosus*, ×
 „ *polyphyllus*.
 „ *acuminatus*.
Cupania alternifolia.
 „ *lævis*.
 „ *canescens*, ×
 „ *sapida*, ×

SAPINDACEÆ, —Continued

- Stadmanqua Sideroxylon*
Tina madagascensis
Harp. ha cer moides.
Prevardia sapida.
 „ *dulcis*.
Nephehum Litchi, ×
 „ *Longan*, ×
 „ *variabile*, ×
 „ *rubrum*, ×
 „ *verticillatum*
Syzygia Rambutan
Melicocca bijuga, × †
 „ *diversifolia*.
 „ *sp.*
Dodecaga burmanntana, × †
Cossignea borbonica, †
Schlotheimia trijuga, × †
Millingtonia simplicifolia, × †

HYPOCASIANÆ.

- Esculus pulcherrima*

POLYGALÆÆ

- Polygala arvensis*, †
Secundaria paniculata, × †

ELATIINÆ

- Bergia verticillata*, †
 „ *amifanoides*, †

LINKÆ.

- Linum trigynum*, × †
 „ *tetragynum*, × †
 „ *usitatissimum*, †

STERCULIACEÆ.

- Sterculia pallens*, × †
 „ *ornata*, †
 „ *Balanghas*, × †
 „ *urens*, × †
 „ *colorata*, × †
 „ *comosa*, ×
 „ *heterophylla*, ×
 „ *acidifolia*.

STERCULIACEAE,—Continued.

- Sterculia villosa*, X ‡
 „ *platanifolia*
 „ *alata*, X ‡
 „ *guittata*, X ‡
 „ *lanceæfolia*, ‡
 „ *coccinea*, X ‡
 „ *parviflora*.
 „ *angustifolia*, ‡
 „ *fetida*, X ‡
 „ *populnifolia*, X ‡
 „ *campanulata*, X ‡
Heritiera minor, X ‡
 „ *macrophylla*, X ‡
 „ *acuminata*
Ochroma Lagopus, ‡
Helicteres Isora, X ‡
 „ *pulchella*, X ‡
 „ *spicata*, ‡
 „ *angustifolia*, X ‡
 „ *virgata*, X ‡
 „ *elongata*, X ‡
 „ *hirsuta*, X ‡
Bombax Ceiba, ‡
 „ *pentandrum*, ‡
 „ *heterophyllum*, ‡
 „ *malabaricum*, X
Adansonia digitata, X ‡
Pentapetes phænicea, ‡
Dombeya acutangula
 „ *undulata*.
 „ *astrapeoides*.
 „ *tiliæfolia*.
 „ *palmata*.
Pentaglottis tomentosa, ‡
Actinophora fragrans.
Pterospermum suberifolium, X ‡
 „ *acnifolium*, X ‡
 „ *acuminatum*
 „ *semisagittatum*, X ‡
 „ *lanceæfolium*, X ‡
 „ *aceroides*, X ‡
 „ *reticulatum*, ‡
Astrapea Wallichii.
Kydia calycina, X ‡
 „ *fraterna*.
Enolœna Wallichii.
 „ *Hookeri*.
Microchlœna spectabilis, X
Theobioma Cacao, ‡

STERCULIACEAE,—Continued.

- Abroma augustum*, X ‡
Guazuma tomentosa, X ‡
Commersonia echinata, ‡
Byttneria pilosa, X
 „ *aspera*, X ‡
 „ *catalpifolia*.
 „ *ovata*, X
 „ *sp.*
Klemhovia Hospita, X ‡
Melochia thicæfolia, ‡
Glossospermum pyramdale, ‡
 „ *velutinum*, X ‡
Riedleia guazumifolia, X ‡
 „ *borbonica*, ‡
 „ *corchorifolia*, ‡
Waltheria indica, ‡
 „ *velutina*, ‡

MALVACEAE.

- Malva polystachya*, ‡
 „ *scoparia*, ‡
 „ *mauritiana*, ‡
 „ *peruviana*, ‡
 „ *caroliniana*, ‡
Malvaviscus arboreus, X ‡
Althœa rosea, ‡
Malachra fasciata, ‡
 „ *capitata*, ‡
 „ *heptaphylla*, ‡
Urena lobata, ‡
 „ *macrocarpa*, ‡
 „ *sinuata*, ‡
 „ *lappacea*, ‡
 „ *regida*, X ‡
 „ *tricuspis*, ‡
Sida nudiflora, ‡
 „ *angustifolia*, ‡
 „ *macrophylla*, ‡
 „ *acuta*, ‡
 „ *humilis*, ‡
 „ *polyandra*.
 „ *lanceolata*, ‡
 „ *retusa*, ‡
 „ *rhomboidea*, ‡
 „ *rhombifolia*, X ‡
 „ *cordifolia*, ‡
 „ *crispa*, ‡
 „ *tomentosa*,

MALVACEAE,—Continued.

<i>Sida</i>	<i>horrida</i> , ‡
„	<i>asiatica</i> , ‡
„	<i>indica</i> , ‡
„	<i>graveolens</i> , ‡
„	<i>mollis</i> , × ‡
„	<i>cristata</i> , ‡
„	<i>arida</i> , × ‡
„	<i>montana</i> , ‡
„	<i>periplocifolia</i> , ‡
<i>Abutilon</i>	<i>striatum</i> , × ‡
<i>Lagunera</i>	<i>Patersonia</i> , ×
„	<i>lobata</i> , ×
<i>Anoda</i>	<i>hastata</i> , ‡
<i>Pavonia</i>	<i>odorata</i> , ‡
„	<i>rosea</i> , ‡

MALVACEAE,—Continued.

<i>Rovonia</i>	<i>zevlantica</i> , ‡
<i>Hibiscus</i>	<i>fulgens</i> , × ‡
„	<i>populneoides</i> , × ‡
„	<i>Lindleyi</i> , × ‡
„	<i>tortuosus</i> , × ‡
„	<i>macrophyllus</i> , × ‡
„	<i>Rosa sinensis</i> , ×
„	<i>phœniceus</i> , × ‡
„	<i>syriacus</i> , × ‡
„	<i>rigidus</i> , ‡
„	<i>peruvianus</i> .
„	<i>Lampas</i> , × ‡
„	<i>culmus</i> , ‡
„	<i>vitifolius</i> , ‡

(To be continued.)

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of November, 1843.

Days of the Month.	Moon's Changes.	Moon's Horizontal Pa- rallex at Noon.	Observed at 9 h. 50 m.				Aspect of the Sky.	Observed at 4 P. M.				Upper.	Lower.
			Temperature.		Wind.	Direction.		Temperature		Wind.			
			Barometer.	Of the Mer- cury.	Of the Air.			Of the Surface.	Of the Mer- cury.	Of the Air.	Of the Surface.		
			Inches	°	°	°		Inches	°	°	°		Inches
1		☾	30.041	78.5	82.2	74.5	N.	29.954	80.0	84.4	74.5	.....	Clear
2		☾	30.042	77.0	80.8	74.0	N.	29.930	79.5	82.7	76.5	.....	Generally Clear
3		☾	30.045	77.2	80.7	76.0	N.	29.918	79.5	81.0	77.0	W.	Clear.
4		☾	30.055	78.0	80.0	74.4	N.	29.890	80.9	85.0	78.0	W.	Clear.
5		☾	29.989	78.5	82.0	75.5	N.	29.905	81.1	85.0	78.8	.....	Clear.
6		☾	30.025	77.8	80.4	75.3	N.	29.933	84.0	81.2	78.0	.....	Clear.
7		☾	29.978	77.5	80.0	75.0	N.	29.977	80.0	83.0	77.0	.....	Clear.
8		☾	29.958	77.8	80.5	75.0	N.	29.977	81.0	83.9	77.0	.....	To the N. E. Cumulo- strati
9		☾	29.974	78.8	82.4	74.0	N.	29.982	79.5	82.0	76.7	.....	Cumulo-strati
10		☾	29.974	78.8	82.4	73.0	N.	29.982	79.5	82.5	76.0	W.	Clear.
11		☾	29.958	78.5	80.0	74.2	N.	29.982	77.8	83.0	75.0	W.	Clear.
12		☾	29.957	76.0	79.8	74.0	N.	29.935	80.0	82.5	75.0	W.	Generally Clear
13		☾	29.977	76.4	79.0	74.2	W.	29.941	80.5	84.0	75.0	W.	Clear
14		☾	29.949	77.0	79.5	74.5	W.	29.977	81.0	84.5	75.4	W.	Clear.
15		☾	29.962	76.2	79.7	76.0	N.	29.934	80.0	82.0	77.0	.....	Clear.
16		☾	29.906	76.0	79.0	75.0	N.	29.955	79.4	82.0	77.0	.....	Cirro-Cumul.
17		☾	29.940	75.5	80.4	74.0	W.	29.929	82.0	82.0	78.0	W.	Cumul.
18		☾	29.973	74.8	78.0	73.2	N.	29.900	80.1	83.0	75.8	W.	Cumul.
19		☾	29.955	74.8	76.5	72.5	N.	29.905	79.0	82.0	75.0	.....	Clear.
20		☾	29.955	75.0	78.0	73.7	N.	29.900	78.2	81.0	76.0	.....	Clear.
21		☾	29.918	75.0	77.0	73.2	N.	29.977	77.2	82.0	76.2	.....	Generally Clear.
22		☾	29.926	75.0	78.3	72.8	N.	29.947	77.4	80.0	74.4	W.	Cumul.
23		☾	29.989	73.0	75.8	70.0	W.	29.946	77.4	80.0	72.8	W.	Clear.
24		☾	29.980	71.4	74.0	69.0	W.	29.940	75.0	78.0	71.0	.....	Clear.
25		☾	29.900	73.0	76.0	70.0	N.	29.938	74.9	80.0	74.0	.....	Cumul.
26		☾	29.938	72.9	75.8	70.0	.....	29.938	75.2	80.0	73.8	.....	Clear
27		☾	29.902	70.8	72.8	64.8	(sharp)...	29.929	75.0	77.2	73.0	W.	Clear.

Correspondence and Selections.

EXPERIMENTAL CULTIVATION OF WHEAT AND BARLEY AT DELHI

Extract of a letter from G. H. SMITH, Esq. to JOHN ALLAN, Esq.

"I send you some specimens of cotton grown in the Doon, as also various musters of wheat and barley grown by myself in my experimental farm at Delhi.

* * * * *

"There are twelve descriptions of wheat and six of barley, all the produce of acclimated seed. I would call particular attention to the Cabool wheat, the original seed of which was sent me by Sir W. McNaghten, in 1834, and which appears to me of a very superior quality.

"My object in sending the specimens is to enable the Society to judge, whether amongst them some cannot be selected fitter for the English market, should wheat ever be largely exported from India. I explained to you personally, why I was unable to reply to the Society's circular regarding wheat. I will here merely state that, as nearly as I can judge, good wheat can generally, in good years, be landed in Calcutta from the Upper Provinces, at the rate of 2 rupees per maund, all charges included. •

"I must not forget to mention that all the grains sent suffered much from blight, which followed several heavy hail storms they were subjected to, and which has materially injured their appearance."

- | | |
|--|--------------------------|
| 1. Mooltanee wheat. | 10. Daoood Khanah ditto. |
| 2. Egyptian ditto. | 11. Moturee ditto. |
| 3. Country ditto. | 12. Wheat from Mary. |
| 4. Hussungabad, ditto. | 13. Urzec Barley. |
| 5. Cabool ditto. | 14. Boulderson's ditto. |
| 6. Barbary ditto. | 15. Hazarah ditto. |
| 7. Perennial ditto. | 16. Simla ditto. |
| 8. Wheat from the banks of the
Sutlege river. | 17. English ditto. |
| 9. Boulderson's wheat. | 18. Mewah ditto |

Report on the above Samples. By WILLIAM HAWORTH, Esq.

I have the pleasure of annexing a brief report upon the samples of wheat and barley you forwarded to me on the 29th ultimo. I regret it is not in my power to report more favorably upon the numerous samples I have examined. There are some fine grains amongst them, but unfortunately of too hard a nature for home consumption; one only, the "Cabool wheat," is adapted to suit the wants of the English miller. Most of the barley samples appear to be in bad condition, and are of a peculiar description, such as I have not met with before; they appear to have been husked.

Report on Wheat Samples.

1. *Mooltanee Wheat*.—Hard, flinty, long grain, mixed with a few grains of good soft white; it is not at all suited for the English market on account of its hardness.

2. *Egyptian*.—Long grained, very hard, flinty wheat, and in other respects like sample No. 1, unsuitable for the English market.

3. *Country*.—This would be known in the Calcutta bazar as *Jamallee*; it is a poor small grain, fit only for making into low descriptions of flour for native use; it soon heats in bulk.

4. *Hussungabad*.—This wheat would be called good *Gungajelly* in the Calcutta bazar, and it would make good soojee, biscuit and household bread, &c.: it is too hard and flinty for the English market.

5. *Cabool Wheat*.—This is a good character of wheat, well suited for the home market, from its good colour and softness, it is a grain very liable to be attacked by weevils if stored in bags; the sweating of a general Indian cargo would also injure it much; it is not well grown.

6. *Barbary*.—This wheat is like sample No. 1, in form and size of grain, and for the same faults of hardness, &c. is not suited for the home market.

7. *Perennial*.—Resembles in every respect the sample No. 3, or country *Jamallee*, and not suitable for export; the flour made from this description of wheat soon spoils.

8. *Wheat from the banks of the Sutlege*.—Is a very poor, ill-grown, hard grain, not worth carrying to a distant market.

9. *Boulderson's Wheat*.—This is again like sample No. 3 and 7, or exactly like country *Jamallee*, only fit for Indian use.

10. *Daood Khannah*.—Is like sample No. 4 or Hussungabad wheat, say the *Gungajelly* of the Calcutta market, hard, and flinty grain, would make good soojee, and could only be used at home to mix with ill-got English grain, in bad harvests.

11. *Matura*.—Appears to have been grown from a moderately good seed, of the soft white description; the crop I should think, must have been a miserable failure caused by excessive drought; in its present condition it is not fit for food.

12. *Wheat from Mary*.—This is rather a small grain and thick skin, but on the whole a better description of country or *Jamallee* wheat than any of the other samples of the same nature; still it is not a grain suitable for export to a wheat growing country.

13. *Barley*.—The samples of this grain which are in fair condition, are small, and thick skin, there is nothing in their appearance to recommend them, and would not compare in quality with the low or middling kinds of English-grown barley.

Such samples as are in bad condition appear to have been heated, and are either of a skinless sort, or they have been husked; the grain of some appears plump and well grown.

(Signed) WILLIAM HAWORTH.

Cossapore, 8th March, 1844

OIL FROM THE NUT OF THE TERMINALIA CATAPPA, OR COUNTRY
ALMOND.

Extract of a letter from A. T. SMITH, Esq. dated Jessore, December, 1843.

I am in receipt of your favor of the 8th instant, and have to thank you for your encouraging notice of the almond oil, as well as for your kind and ready attention to my numerous requests.

The oil in question was made in the common native mill (the pestle and mortar fashion) and was the produce of some almonds gathered by my *mallee*, in a few mornings, before commencing his labours in the garden; his success every morning depended entirely upon the earliness of his appearance under the trees, as the children about the neighbourhood carry off the fruit at day break, and

even earlier for the sake of the kernels. After a sufficient quantity was gathered and allowed to dry in the sun for a few days, which facilitates breaking the nut, I set 4 coolies to work with small hammers, to clear the kernels from their shells, and in 4 days they broke a sufficient quantity for one mill, viz. 6 seers, and which in the course of 3 hours after it was put into the mill produced about 3 pukka seers of oil, the pressing of the oil therefore is of no consideration, as the value of the oil cake, to feed pigs, &c. is sufficient to cover that expense, but the breaking of the nuts is one of chief consideration and would require particular attention, with a view to its reduction, if it be deemed profitable to manufacture the oil on an extensive scale. From the mill the oil was first received into a bason and afterwards filtered through blotting paper. The colour of the oil is that of pale sherry, which is owing to the rind being allowed to remain with the kernels; I deem it necessary to mention this, as on comparing it with the real almond oil this circumstance may prejudice its value. The charge of planting the trees (*Terminalia Catappa* of Roxburgh) should also be taken into consideration, and of which I am sorry I cannot give any idea, as I am ignorant of the time it would take for the trees to become fruitful, but when once in bearing, the quantity of oil that may be expected from each tree may be safely reckoned at 3 seers annually. The tree is acknowledged to be highly ornamental, and it might be more extensively introduced into parks, avenues, &c. than at present, and even large plains might be planted out with it, with advantage, as the wood is stated by Roxburgh to be useful. I should however like to know to what use it is turned, and would be thankful for any information you can give me on this point.* Moreover, a plantation

* *Extract of a letter to A. T. Smith, Esq.*

I regret I cannot give you any definite information on this subject. Roxburgh, as you observe, states the timber to be good; so says Capt. Baker in the remarks appended to his catalogue of Indian Woods, presented to the Society of Arts. Dr. O'Shaughnessy, in his Dispensary, calls it a valuable timber tree, and adds, that the bark and leaves are very astringent and yield a black paint. An architect of this city, who has, I imagine, as much experience in such matters as any of his profession, replied to my query as follows.—“I have never heard of the Wood of the country almond tree being used. It appears to be a close grained wood, and I should think would answer very well if properly seasoned. It is not procurable in the market.”

of this tree is deserving the attention of wild silk or tussar worm growers, since the worm thrives exceedingly well upon its leaves, thus every part of the tree, fruit, leaves, and wood, can all be brought into use, and which I believe is the greatest economy in all kinds of manufacture.

Report on the above Sample of Oil. By F. J. MOUTAT, ESQ., M. D.

I have compared the specimen of oil prepared from the country almond by Mr. A. T. Smith, with a good muster of the ordinary European almond oil in my possession, and find that in taste, smell and specific gravity the former is very similar to the latter, but is deeper in colour, becomes turbid in keeping, and deposits a quantity of white stearic matter. In most ordinary purposes, medicinal and otherwise, the former I think might profitably be substituted for the latter in this country, and if expressed with greater care, and freed from every impurity, might become an article of commercial value and importance

EXPERIMENTS AT MANUFACTURING SUGAR FROM THE STALKS OF
INDIAN CORN.

Extract of letters from C. B. TAYLOR, Esq., dated Palamou, 11th and 30th November, 1843.

I have the pleasure to inform you that I have this day forwarded to Dinapore to the care of Mr. F. Smyth, a merchant and agent residing at that place, with an intimation to hold the same at your disposal, for the purpose of its being presented for examination to the Members of your Society, a box containing 6 earthen vessels of sugar, or more properly speaking, the condensed juice expressed from the stalks of Indian corn—it cannot I apprehend be called sugar, as it will not *gran*; likewise 2 bottles of spirits distilled from the same substance, which I shall call sugar when alluding to it again, although the word may not be strictly applicable. The spirit contained in the pint bottle, was distilled from sugar, produced from

stalks on which the corn had been allowed to ripen, and the stalks left on the field as worthless, after the corn had been plucked off them. The still was a common earthen jar with 3 earthen water pots as condensers, these latter burst during the process of distillation, hence the want of strength, purity and the disagreeable flavour; the sugar was also unrefined. In the second experiment I substituted 3 earthen-ware China jars as condensers, and the sugar used was produced from stalks, off which the spikes of corn had been plucked as soon as they began to form, and the sugar had been refined; the spirit of this distillation you will find in a quart bottle. I am of opinion that a good and palatable spirit may be obtained with a copper still, and having kept sufficient of the goor, have sent for a small still in order to make the experiment. The sugar contained in the earthen vessel, which I have marked No. 1, was produced from the stalks off which the spikes or ears of corn had been plucked when they began to form; the other five vessels contain sugar made from the refuse stalks. I am unable to furnish any data respecting the quantity of saccharine matter to be obtained from any given quantity of stalks, but it appeared to me the proportion was about the same as what is obtained from the sugar cane. This fact, with the cost of production, must be determined in another season.

My attention was drawn to the subject by a paragraph in the *Hurkaru* London Mail of the 4th of March last, and which, to save you the trouble of a reference, I transcribe complete.

“At a meeting of the Chemical Society, on the 23rd February, a communication from Professor Croft of Toronto was read, ‘on the manufacture of sugar from the stalks of the Indian corn,’ an entirely new branch of agricultural industry which is at present exciting considerable interest in the United States. By plucking off the ears of corn as they begin to form, the saccharine matter of this plant is greatly increased, and the juice comes to contain three times more sugar than that of the maple, and equals or exceeds the juice of the ordinary sugar cane, as raised in the United States. By experiments made at Lafayette it is found that one acre of the Indian corn yields 1000 pounds of sugar. This crop has also the advantage, that it comes to maturity in from 70 to 90 days, while the sugar cane requires 18 months, and is precarious.”

It is not however a new or recent discovery, you will find it mentioned under the article Maize in the American Encyclopædia. It is also mentioned in Ward's Mexico.

I have the pleasure to acknowledge yours of the 20th instart, and am much afraid that your Jessore member will find himself disappointed in his expectation of obtaining a grain from the *gour* produced from the stalks of Indian corn, as I have made about 8 maunds, and could obtain no such satisfactory result. I suspect that the saccharine matter does not possess the quality of graining, at least the species that your Jessore member and myself have tried, and which I imagine is the same: but as there are a great many varieties of Indian corn, it is possible that we may not possess the variety from which sugar is made in the United States. In this country there are two varieties extensively cultivated, the one producing corn on spikes, and with which my experiment was made, and the other throwing out the corn from the top something in appearance to wheat, but instead of standing erect like it, bending over in a curve: the first of these species is called in Behar, *Muckie*, and in Bengal, *Junar*, and comes to maturity in 70 or 80 days, the second variety is called *Junar* in Behar and *Da-dou* in Bengal, and takes 3 or 4 months before it arrives at maturity. As I should like much to try the description you have obtained from the United States, I should be obliged by your sending me what quantity you can spare, as I should wish to try the experiment on as large a scale as possible. I will send you hereafter another muster of spirituous liquor when I get a copper still.

Extract of a letter from FREDERICK NICOL, Esq., Jessore, dated 24th November, 1843.

In September last I tried to make sugar from Indian maize stalks. On crushing the stalks through a common horizontal mill upon the native plan, a rather large supply of juice was received of a greenish color, which was boiled in an open earthen pan. The boiling continued for upwards of an hour before the liquor showed any sign of forming itself into a thick consistence: prolonging the process until it was judged to be sufficiently boiled according to the native practice, the material was

then poured into a small vessel, and allowed to stand in a cool place for several days, but as it presented no appearance of granulation, it was submitted to another boiling, and while upon the fire, some manufactured sugar was thrown into the pan to give a grain to the material, placing it as before in a cool place to allow the grain to sink to the bottom. The molasses was drained off, but nothing was found but pure dirt. I should have remarked that there was a large quantity of scum skimmed off during the boiling, much more than is to be found upon either date or cane liquor. Having been unsuccessful with the sugar, I manufactured the material into rum by a small copper sampling still upon Corey's principle. The flavour of the spirit was rather unpleasant, but that is to be attributed to too much having been distilled. The stronger rum is, the more fragrant it is. Porter says rum should be manufactured at 35 to 40 over London proof, not above 40, otherwise it becomes harsh and loses the aroma which it possesses at 35 to 40 over proof.

I shall report progress with the American Maize, and hope to be more successful in obtaining good sugar.

Report by J. COWELL, Esq. on Mr. TAYLOR's sample of Saccharine material.

I regret that I can give you no favourable report on the article which you kindly sent for my inspection some days ago. It has been burnt evidently in its preparation, and possesses in consequence no granulation and an acid empyreumatic taste. It will not answer in its present state any purpose I fear either for the grocer or refiner.

REMARKS ON THE USEFUL PROPERTIES OF THE PHORMIUM TENAX,
OR NEW ZEALAND HEMP.

*Extract of a letter from James A. WOOD, Esq. dated Calcutta,
28th February, 1844.*

I beg to send you a few seeds of the New Zealand hemp plant gathered in the district of "Nelson" in May 1843, and trust they may be found serviceable to the Society. The New Zealand

hemp plant is very hardy, and will thrive in any soil or climate, but it likes swampy land the best. It is often met with in New Zealand thriving three or four feet under sea water. The *Sundervunds*, I think, would suit it well, but there is little dependence to be placed on its propagation from seed. It is easiest increased by slips. It produces a superior cordage to any other hemp in the world, being much stronger in proportion to bulk. In fact the whale ships out of Sydney, Van Diemen's Land, and New Zealand will use no other when they can get it, even if they have to pay more for it. Rope made from it is much prized at home, and is fast coming into general use. Sail cloth or canvas made from it is equally superior, and will outlast any other kind known. The plant when once planted requires no further care. Some 3000 to 4000 tons of this hemp will be exported from New Zealand to England this year. It might become a very valuable export from this country, where labour is so cheap, if once introduced. It is rather difficult to manufacture, but the home people would do that. Why don't the Society send to Sydney for a few hundred slips and try it? There are plenty there, and I will be happy to give you a letter of introduction to my friends there requesting them to assist you in shipping a supply.*

Suggestions for the Importation of Wheat seed from Australia
Communicated in the following letter from BARBO MUTTEFLOLL
SEAL, dated 31st January, 1844.

In case you have any Cape or Australian seed wheat that you could spare, I would thank you for a little of each at your convenience.

I wish to try both in that part of the country whence I draw my supplies of grain for the Strand Mills.

I would have them put into the hands of the parties with whom I have contracts, under the strongest injunctions to have the seeds carefully sown and attended to.

In this way considerable good might be done.

* The Society has acted on this suggestion. An interesting paper regarding this Hemp is published in the first volume of the Society's Journal—Ed.

• Next to suitable soil, climate and good seed, an annual change of seed is most important, as in the Indigo and every other branch of cultivation for instance.*

The native Agriculturists are all sensible of this, but they have no one to help them, and generally they are too poor to help themselves, and are not encouraged as they ought to be.

If the Society have none of the seeds I write for, I would strongly recommend their importing a supply from the Cape and Launceston or Sydney.* The Launceston wheat is considered the best. The cost, at most, would be but trifling, and the benefit might be great.

The best course to follow, after a supply had been got, perhaps, would be to put the seeds into the hands of a party centrally situated for distribution in the wheat districts, as Major Napleton is, for example, at Bhauglepore†.

It is the fine, soft, white description of wheat we stand greatest in need of.

It would also be most desirable that an annual interchange of native seeds should take place amongst the different districts through the same medium. I feel convinced that great improvement in the quality of our own wheat, would result from this plan, if carried out with spirit and discrimination.

In this manner the Bhauglepore Branch Society might again render important service, from its favourable locality, and I would forcibly bring this point to attention.†

It is only by an extensive distribution, and continued interchange of good seeds of the soft varieties of wheat, such as a public body like your Society alone can effect, that any great or lasting benefit will be gained.

But with regard to the wheat, of both kinds, that I apply for, if you furnish me with a little of each, I will let you know the result faithfully, and should it be favourable, repay you back in kind a hundred fold.

* Steps have been taken to meet this suggestion.—ED.

† Good seed of the fine soft white kinds of wheat (for fine flour, the hard sorts being valueless) should be gathered and distributed by it from and to all quarters of the grain districts.

Economy of Manure. By Mr. TOWLER.

We have felt, and, on several occasions, made allusion to, some peculiar advantages that farmers possess above all other persons, and of which they might avail themselves to procure abundance of gratifications which in the general way, they appear to overlook. Some years ago, a few pages of this Journal were devoted to this subject, and, subsequently, our pen has not been idle, where an opportunity was presented, to prove that, as, from their position and the ordinary course of cultivation, farmers require and possess a store of manure, and of other decomposable substances, which extricate a great volume of heat, they might so apply it as to render it of threefold value to the land, and to the general domestic economy of the establishment.

As it is, a dunghill, or mixen, is nothing more than a mass of fermenting materials exposed, in waste places, to the air for many months, wherein its heat and developed gases are lost for the time, while the liquid drainage is absorbed and rendered perfectly unavailable for the purposes to which it is best adapted. Nature, in one sense, is man's best friend; for the gases received by the atmosphere are therein stored, or so laborated, as to be returned to the earth in showers which nourish while they enliven vegetation; but, nevertheless, man is not true to himself while he neglects to improve any one of his resources.

The cultivation of garden vegetables is not usually treated of in an agricultural periodical, but the subject, with strict limitation, is not irrelevant when it can be made to coincide with the preparatory duties of the farm. Such is the case in the instance we are now prepared to notice.

Nearly ten years have elapsed since attention was first excited to a course of routine in the melon department of a large garden intrusted to the management of a person who has reputably retained his situation during twice that period. The machinery employed in the course may be described in a very few lines. A range of pits, of simple four-mech brick-work, are furnished with any number of lights for the purposes required. Those of the garden in question are fifteen in number; they are seven feet long, three and a-half wide, and they slope at an angle of about eighteen degrees, reckoning the ground level as the base line. The number and dimensions are indifferent, provided they conform to the object in view, and always slope to the south, or south by east.

The first operation was to excavate the ground within the walls to the depth of four feet, and then to fill the space with tree leaves from the

park, coppices, and shrubberies, treading the mass, from time to time, till it was rendered compact; it then formed a gentle hot-bed, which (as there was a double range of pits) was used in one instance to grow a set of pine-apple plants, and in another to excite a crop of young potatoes, a quantity of loam being, in the latter case, spread over the leaves after their heat had much moderated. In the meantime, other masses of leaves—the fresher the better—were used as linings to pits, or as hot-beds under frames; and these, collected in autumn, annually, become sufficiently prepared and decomposed, to all intents and purposes, in six or nine months, for the future subjects of the routine.

After the early potatoes, loam was stirred and intermixed with the leaves below to the depth of a full spit, and a fresh quantity of semidecayed leaves, that were prepared during the winter and spring, was laid as a deep hill or ridge under each light. The melon plants for the late crops being ready, one for every hill was planted in its centre, being transferred with an entire ball of roots from its pot, and watered just to settle the soil about them. This planting would take place late in June or early in July.

The lights were closed day and night, and shaded with mats, till the plants were perfectly established and began to grow, but no artificial heat was employed. This was the introductory course of the first season.

We have lately inspected the progress of melons in these pits wherein the lower and now perfectly decayed leaf-soil has never been disturbed for ten years, and have seen the roots wander through the entire substance of the new ridges put on in June. It does not appear that the old-leaf mould is appropriate to the melon, but it forms a mass, and elevates the new ridge toward the glass, a circumstance of moment in melon growing, though, at the same time, it must be insisted on that the new semidecayed leaves, gathered in the preceding autumn, form the pabulum of the melon plants, and a medium more congenial than loam and turf of any kind.

Writers are much in the habit of directing the application of strong maiden loam, and, doubtless, the melon has thriven therein; but it is equally true many failures have occurred, and plants are seen to lie torpid for weeks in loam, whereas they start off at once, retain a rich and intense verdure, and bear much fruit of very large size, in leaf mould. Melons cease to bear in September, and then the beds are cleared with all dispatch to receive another crop, the preparation for which consists in levelling the ridges, laying over the surface a coating of decayed spit dung, reduced almost to the condition of *humus*, and

forking the whole together to produce a pulverized homogeneous bed, in which strawberry plants are set by trowel, six inches apart, in rows (running from back to front) twelve inches asunder. These plants are obtained either by the runners of July, pegged down close to the strongest plantlet, so that it may take root immediately, and come up with a complete ball in September; or, better, by plunging the smallest pots, (size 60,) filled with light loam, and fastening the runner plant upon its surface. These pots are carefully attended to by watering, &c., till they become filled with roots, when the plants and balls are transferred to others of a large size, the soil of which is enriched by adding one-third of mellow dung. This mode of raising strawberry plants is certain, but gardeners find it take up too much time, for the amateur, however, and the farmer who can spare a hand for the work, it is admirable. The best variety of strawberry is the true Keen's seedling, its fruit bearing heat extremely well, and being heavier, bulk for bulk, than that of any other sort, unless we may except (not yet, however, sufficiently proved) the *British Queen*.

The strawberries being planted and watered, the sashes are closed, and kept close for some days, till the roots lay firm hold of the soil; when air is given by degrees, and, at length, before the frost sets in, the sashes are removed, and the plants exposed to the air, by which they not only are fortified, but brought into a state of rest. But, on the approach of vigorous weather, the sashes are put on, and kept closed every night, though air is given by day when there is no falling weather.

After turn of days, and as the power of the sun increases, air and light waterings are given to prepare for the growth, which never fails to commence many weeks ere strawberries in the best open ground give any signs of vegetation.

When the runners protrude, they are removed, and every care taken to promote strong growth, without permitting vegetation to become rank by "drawing," as it is called, through want of air.

The crops thus produced are amazing. We have known 400 ounces to be gathered in April, under a few lights, and sold to a collector of fruit—who, of course, would purchase cheaply—for £14, money down. The strawberry plants impart some loam to the bed; but this is dugged into the leaf-mould beneath, after the fruit is gathered, when the plants are either destroyed or moved to some plot in the garden where it is intended to make a fresh plantation.

There is a considerable demand for this fruit in the neighbourhood of great towns, about the month of April, five or six weeks before the

time when they ripen in the open air ; and, near London, persons make a business of calling at gentlemen's gardens to collect fruit through the season. For strawberries they pay from 9d. to 4d. per ounce, gather the fruit, pay for, and take it away without any trouble to the grower. In the meantime, the public pay, in the shops, from 10s. 6d. to 1s. 6d. per ounce. An amazing difference, which, however, is of no avail to the grower, who, were he to apply to the great fruit-shops, would receive very little extra remuneration, though he were obliged to incur the entire trouble and risk of conveyance.

Most persons force strawberries in pots—hence the supply is limited ; but were pits adopted, the plants would be abundantly more productive, and the pits always in requisition for successive crops, which may be rendered profitable to a greater or less extent. In the establishment which we have taken as a model, the crop after strawberries continues to be late melons, prepared for annually by the leaves collected in the preceding autumn.

There are two or three objects of moment to be considered. The first is a range of pits, say of twelve lights, divided by a four inch brick wall into three departments, which may provide every sort of vegetable or fruit which a farm could require, early and late, by aid of the dung at hand, which might be timely and advantageously heaped at back, and, indeed, round the erections, while, by a simple contrivance, the liquid drainage could be made to pass into a cemented tank furnished with a pump. Experience, and the object in view, must regulate the heat to be applied ; but whether the manure were hot or cold, it might be profitably deposited around the walls. Farmers, therefore, possess appliances which the gardener is frequently obliged to purchase at high prices. Second leaves of trees, reduced to that condition wherein they become brown, moist, adhesive masses, are so congenial to the roots of the melon, that it is no uncommon thing to see them trace ten or more feet in length, sending forth laterals even to the surface in every direction.

Black perfectly reduced *leaf-mould* is one of the purest conditions of vegetable aliment ; in it the strawberry revels ; but for the melon the hill or superstratum must be renewed yearly.

In a pit of three divisions, early potatoes may be substituted, in one of them, for strawberries, and be off in due time for late melons. Early melons can be raised by warm linings applied in March, and *cucumbers* at any season of the year.

In the garden referred to, the same soil has remained in one large pit for ten or more years, and never have we seen fruit produced in

greater abundance or of finer quality than in that department. Why then should a farm be destitute of an appendage which it is calculated to support in a style altogether superior?

We have of late years heard a good deal concerning diseases and failure of potatoes; and in the present season mention is made of blanks in the rows. We have proved, and so have many others, that a blank is no proof of a failure; as, from some cause, a haulmless potato may furnish a numerous and fine progeny of tubers. This circumstance will serve as an introduction to an experiment upon the production of very early potatoes, which, coming from the pen of the late Mr Knight, in a private letter, dated June 12, 1832, may be much appreciated, and certainly will not be irrelevant to our subject. He wrote thus—

“I collect the largest of my early potatoes so soon as ripe, in the end of July, and lay them close to each other upon the ground, covering them about two inches thick with mould. Thus circumstanced, they vegetate in the autumn; and if the young shoots then produced be taken off, and the tubers preserved, *they generally will not produce foliage*, but will immediately generate tubers. These will ripen more or less early in spring, in proportion as the tubers are kept more or less warm; and it will be easily practicable to obtain young potatoes of exceedingly good quality during the months of May and June. There will always be periods of considerable length between the period of the tubers having acquired their growth, and subsequently becoming *excitable*, and during that period they are very good. Under favourable circumstances, *three bushels* of old tubers will afford about *one* of new at this period, (May and June.) Now, as I can certainly raise, and am doing it, 600 bushels and upwards on the acre, the produce of half an acre of such potatoes in young tubers, if sold, must be a very profitable crop.”

This process had previously been communicated to the Horticultural Society of London, and it proves that, if, by accident or design, a first development of shoots be removed, and the tubers then remain for some weeks out of the ground, they will be very likely to produce a new crop of tubers within the soil, without exhibiting any appearance of external vegetation.—*Journal of Agriculture*, Oct. 1843.

On the Manuring and Steeping of Seeds. By JAMES F. W. JOHNSTON, F.R.S.S.L. *Honorary Member of the Royal Agricultural Society of England.*

Public attention has lately been drawn in this country to the possibility of so manuring or otherwise doctoring the seeds of our usual grain crops, before they are put into the ground, as to do away with the necessity of manuring the soil itself. It has been long known to practical farmers that, by steeping their seeds in urine, in salt and water, or in other solutions, and sprinkling them while wet with quicklime, their growth is in many cases promoted, and rust, smut, and similar diseases, in great degree prevented. It has been observed also in regard to potatoes, that in some soils a dusting of lime makes the cuttings more productive than they would otherwise be, and that, when powdered with gypsum, they thrive still better. The absolute effect indeed of all such applications to the seed-corn or to Potatoes, will in every case be modified by the kind of soil in which the seed is sown. If the soil abound in common salt, the salting of the seeds will be less efficacious, while if it be rich in lime or in gypsum, the dusting of the potatoes with these substances will produce a less striking effect. Yet the above observations of practical men shew that it is possible in certain circumstances, and by the use of certain substances, so to doctor or manure the seed we intend to sow, as to make the growth of our crop more sure, and the return of our harvests more abundant.

From this *limited* conclusion, which is justified by experience, some persons have hastily leaped to the *general* assertion, that all seeds may be so doctored as, in all circumstances, to grow more luxuriantly--and still farther, that they may be so treated as to render unnecessary any manuring of the soil in which they are to be sown.

It is in Germany that this latter broad assertion has been most confidently made and most pertinaciously repeated. It has met with some credence also among ourselves, from persons chiefly who, like the German fathers of the statement, know a little more than the generality of practical men, but who do not know enough to enable them to see the difficulties that beset their own views, nor the limits within which their statements are true.

It will, no doubt, interest the British farmer to read the statements of those who bring forward these novel views, and to consider the degree of probability which exists as to their expectations being realized.

The great discoverer in this new line is Franz Heinrich Bickes of Castel, near Mayence, who has published a pamphlet under the title of

an "Account of the Discovery of a Method of Cultivating the Soil without Manure,"* in which he thus speaks —

"The discovery—of cultivating the soil without manure—has been carefully verified in different countries, and in the most dissimilar soils.

"It is twelve years since the discovery was made, and it has, during this time, been more and more tested.

"The experiments have been made at various seasons of the year, and the same crop has been repeated on the same soil without regard to the usual rotation of crops.

"The cost is very trifling—a shilling or two an acre—and the supply of substances used instead of manure is inexhaustible."

He then expatiates on the importance of his own discovery.

"It is not good," says Plato, "to push on investigations too far, the natural sciences find their limits, beyond which the mantle of Isis covers what is mysterious. Can any one reveal the nature of force, of life, and of motion? *The mantle of Isis is now, by this discovery, at length removed!*"

"It is not the discovery of a mere crude substitute for manure, but the result rests on a knowledge of the nature of plants by which the vital power is increased in all respects, and their existence elevated and ennobled!"

Here follow some of the results of his new method.

"Who can assign limits to the growth of a plant?"

"I possess dried plants of wheat, consisting of fifty-six and fifty-seven stalks. Indian corn, grown in a poor soil, with three or four stems and eight or nine heads. Sunflowers eleven feet high, with flower disks fourteen inches in diameter, and seeds as large as small coffee beans. Potatoes above seven feet high, and tubers in proportion.

"Vermas and Havannah tobacco have, for eight years preserved the well known flavour of their native country.

"Drift sands have produced crops equal in quality to the neighbouring loams.

"All parts of the plants, stems, roots, leaves, seeds, fruits, have been equally improved—the tubers of potatoes, and other roots, are tenderer and more agreeable to the taste. Turnips and fruits more abundant in sugar, flowers of brighter hues and higher perfume.

"Agriculture can now be prosecuted after an entirely new method. Manured every year almost without cost, plants will develop themselves almost spontaneously, and yield the largest returns.

* Mittheilung über die Erfindung der Boden ohne Dünger anzubauen, von Franz Heinrich Bückes in Kastel bei Mainz. (Dusseldhal bei Dusseldorf, 1843.)

"A rotation of crops is a mere beggary from the soil! Every third, fourth, or fifth year, the farmer manures a third, a fourth, or a fifth of his whole farm, and in return he has the pleasure of seeing his fields green without putting much into his pocket—while now the most profitable crops may be raised with a luxuriance hitherto unknown."

The author here calculates the present cost of manuring the soil, and supposing the new method to cost only one-fifth, shews how many millions the adoption of it would annually save to every nation in Europe. He then adds—"Consider how land in every country at present yields little or nothing, and yet might be brought into the greatest fertility, and how many happy people might enjoy life upon it who are at present a burden to the state.

"Look to England. What fearful want now exists in that country, the resources of which are every year diminishing. Men daily die of hunger, and the most talented statesmen are without hope of mitigating the evil. For several years past the city of London has been paying 21,000,000 of florins of poors' rate, while the whole of Germany pays only 60,000,000.

"Berlin pays annually 410,000 florins, and 40,000 souls are tax-free. All these could find, *in the neighbourhood*, land susceptible of cultivation, on which they could not only live, but from which they could pay taxes to the state."

"Potatoes are vegetable bread; Indian corn also is wholesome nourishment; both grow beautifully on the lightest drift sand: *with the former the whole sea-shore might be covered.*"

The practical farmer will justly consider that Bickes' mode of treating his seed potatoes must be something wonderful, to make them grow well on the sandy downs that line so much of our coasts. But he proceeds to give testimonials as to the efficacy of his method and the truth of his statements. These testimonials are from practical men in various parts of Germany, and must be deserving of credit *to a certain extent*. It will be proper to hear what they say. The first two are dated Vienna, 1829, and are signed by four persons; they refer to seed sown in the imperial gardens. From the second of them I quote the following:—"In general, the plants from the prepared seeds exhibited a very much stronger growth, were of a deeper green, had thicker stems, finer and fresher leaves, larger grain, and the grain was thinner skinned, and therefore contained more meal. In particular,

"1. The hemp was of a much larger size, and had many side shoots bearing seed.

"2. The Indian corn had more heads.

"3. The buckwheat was upwards of three feet high, and full of seed.

"4. Wheat, rye, barley, and oats are thicker, and have more numerous stems, larger ears, and more grains in each.

"5. The Lucerne was beyond all comparison stronger, had more shoots, and its roots were as thick again.

"6. The disks of the sunflower were doubled in diameter, the cabbage had large heads, the cucumber large fruit, while the unprepared seed yielded nothing."

I quote further what must be considered as a mere opinion, adopted in part, no doubt, from the sanguine Mr. Bickes himself.—"Since this highly beneficial discovery renders all manure unnecessary, and can be applied to the poorest soils without the necessity of having a previous stock of cattle to produce manure—which, from want of fodder, is in many places impracticable—as the material is of little cost, and as the corn crops will require less seed, its benefit to agriculture must in many respects be incalculable."

The next two testimonials are dated from Offenbach, in August, 1830, and are signed by five persons. Three of these had allowed their seed to be prepared by Mr. Bickes, and thus speak of the effects when sown upon their own fields.—"The prepared wheat had from ten to fifteen stalks from each grain of seed, and the ears and grain were larger. The rye had nearly one-half more, and larger grains in the row. The two-rowed barley had from eight to fifteen stalks from a single seed. Generally the produce was greater than on the best fields of their farms. The prepared flax was one-half heavier in stems and seed capsules, and the latter were double in number; and when the unprepared had already become yellow, the prepared was still of the deepest green. But the potatoes excelled everything yet known in the most productive fields. From a single potato there were seldom less than ten and sometimes seventeen strong stems, while, in the best fields, there are seldom more than one-third of this number."

All other plants, clover, beans, turnips, &c., are said to have been equally benefited. One-fourth only of the usual quantity of seed—of wheat and rye—was sown on a poor unproductive clay, and yet the produce was greater than on the newest land of good quality, though aided by manure.

Two testimonials follow, dated September, 1831, signed by burgomasters, town-councillors, gardeners, schoolmasters, farmers, and land-valuers, seventeen in number. The following is an extract from the one which relates to experiments made in a garden at Budingen—

"1. Several sunflowers had a height of ten to eleven feet, the foot of the stems being eight and a-half and nine inches in thickness. The stems consisted of firm wood, and contained as much combustible material as young fir trees of eight or ten years of age.

"2. Ten, or twelve potato plants gave on an average thirty large potatoes each, and had stems seven feet in height."

"3. Fifteen stalks of Indian corn had on an average five heads each, some having as many as eight or nine heads to a single plant."

The next experiments quoted by the author were made at Amsterdam in 1834 :—

"The buckwheat was four and a-half to five feet high, the flax had four to five stems from each seed, the Indian corn was nine to ten feet in height, and had four to five heads from each seed. The white clover was as large in the leaves and stems as the red clover usually is; the red clover and lucerne three feet high.

"These results were obtained from the prepared seeds alone, without manure, on a depth of six or eight inches of the drift sands of the Downs, arranged in beds for the purpose of the experiments."

Between 1834 and 1839 nothing is recorded regarding the progress of the author's discovery or researches, and he leaves us to infer that, in this interval, nothing had been done—since, under the date of September, 1839, he inserts only an extract from a Mayence newspaper, containing a statement of some of the results obtained in the former years. To this is subjoined one other testimonial, dated November, 1841, declaring that his potatoes, sown on unmanured soil, were superior to any others in the neighbourhood of Castel, where Mr. Bickes resides.

I think the conclusion which is fairly to be drawn from a careful perusal of this pamphlet is, that, for a few successive years, the author had made experiments upon the preparing of seeds, and out of a number of less successful had obtained some very interesting and striking results; that he had then laid the matter aside for about as many years more, and again, in 1841, made a solitary experiment or two, which he has incorporated with his previous results in his pamphlet of 1843. For twelve years, therefore, he has been more or less occupied with the subject, but during all that time he has never published or given any account of his process for preparing the seeds according to his method. He is one of that class of discoverers who wish to sell their secrets, and, by magnifying their importance, hope to derive a larger profit from divulging them. With such men the true friends of agriculture can have no sympathy.

I do not think, however, that his pretensions are wholly unfounded, or that, by a skilful study of the preparation of seeds, much good may not hereafter be derived by practical agriculture. The reasons for this opinion will appear in the sequel.

Another German pamphlet on this subject has lately appeared from the pen of a Mr. Victor, an apothecary at Neu'erholm, in Hesse Darmstadt, under the title* of "*The Manuring of Seeds, or a Simple and Cheap Cultivation of the Soil by the Artificial Manuring of Seeds, by which, at the same time, the Rust and other Diseases of the Corn Crops are prevented, practically tried for Five Years, and proved on a large scale.*" By C. L. VICTOR. This author describes his methods, and is in so far more worthy of the attention of the practical man. Before detailing these methods, however, I shall insert a few of his preliminary observations.

As the principle upon which the manuring of the seeds ought to be preferred to that of the soil, he remarks "that the manure can never be so equally distributed through the soil that the due proportion of food shall be given to each seed or plant; and that, besides, before the plant comes to require it, much of the organic matter of the manure has become decomposed and lost, and that even the inorganic matter is liable to assume forms of combination in which it can with difficulty be made available to the nourishment of the growing plant."

These disadvantages, he says, may be avoided by manuring the seeds themselves which we wish to grow, while, at the same time, the following advantages will attend the adoption of this method.—

"1. The same crop may be repeated on the same soil though already exhausted, or even in any usually unfruitful soil.

"2. We can manure the seeds with those special substances only which it is not likely to find in the soil, or of which it has been exhausted by previous crops."

This is an advantage which is possessed by all saline and mineral manures, and is one of those benefits which will appear more clearly and strikingly to the practical man as he becomes more familiar with the natural wants of the crops he wishes to raise, and with the kind of substances which are present in his soils and in the manures—such as farm-yard manure—which he usually employs in preparing them for the seed.

"3. As the rotation of crops is rendered necessary chiefly by the abstraction of saline substances from the soil, it may be rendered unne-

* Die Saamen-dungung oder einfache und Wohlfeile anbauung des Bodens durch Kunstliche dungung des Saamens, &c. &c. Frankfurt am Main, 1843.

cessary by adding again these substances in such a way as to be within the reach of the seeds only. Thus, by steeping the seeds in sal-ammoniac, and drying them with flour, the deficiency of salts may be supplied.

"4. The rust and other diseases of corn plants are owing either to an excess or to a deficiency of food in the soil. These extremes can be best avoided by manuring the seed itself with the proper materials and in the proper degree. "Thus," he says, "in a field of wheat after oats, upon a poor soil, a portion of the seed which had been prepared with sal-ammoniac, gave only a light crop, while another portion, prepared with oil also, gave a crop twice as heavy."

Influenced by the considerations above stated, some of which may, to a certain extent be regarded as questionable, Victor has been induced to try the manuring of the seeds before they are sown, and, from the success which has attended his results, to recommend it to others. The substances he employs, and his mode of using them, are as follow:—

Substances employed.—1. *Blood*, in the liquid state, is mixed with one-eightieth of its weight of glauber salts, dissolved in a little water; when thus mixed, it may be kept for a long time in a cool place without congealing or undergoing decomposition; or clotted blood may be dried either alone or mixed with a little earth or powdered clay, and then reduced to fine powder.

2. Wool, hair, parings of leather, horns, hoofs, and bones, are charred in close vessels, until they are capable of being reduced to powder.

3. The dung of all animals is dried and reduced to powder.

4. Fats and oils of all kinds are mixed with so much earth, clay, or rye-meal, as will enable the whole to be reduced to powder. Oil-cakes are also powdered for use.

Mode of using them.—He makes up a semi-fluid mixture with which he mixes the seeds, and then he dries up the whole by the addition of the powdered manures already prepared. His semi-fluid mixture is thus prepared:—For a bushel of wheat or other grain, take

20 to 30 lbs. of clay in fine powder.

1½ lbs. of pounded sal-ammoniac, or 3 lbs. of common salt.

3 to 5 quarts of whale, rapé, or other cheap oil.

15 to 20 quarts of fresh blood, or blood kept in a fluid state by means of glauber salts, or, in the absence of blood, as much water.

3 to 5 lbs. of linseed meal or pounded oil-cake.

These are mixed together intimately, and water added, if necessary, to make a half-fluid mass. The seed is then to be poured in and stirred about till every seed is completely enveloped by the mixture. A layer of one of the following dry mixtures is then spread on the floor, over it the manured seed, and then another layer of the dry powder. The whole is then stirred together and left to dry.

Dry Mixtures.—Of these drying mixtures he describes several, consisting chiefly of powdered clay, mixed with one or other of the dry powders already mentioned. Thus he recommends mixtures of

1. 75 of powdered clay, 8 horn shavings, and 17 of bone dust.
2. 85 of clay, with 15 of fluid, or 5 of dried blood
3. 85 of clay, 5 of charred hair, and 10 of oil-cake.
4. 60 of clay and 40 of powdered dung.
5. 70 of clay, 25 of charred leather, and 5 of bone dust.
6. 80 of clay, 1 of fat, tallow, or oil, and 2 of powdered dung.

These are all to be finely powdered and intimately mixed. The principal alleged use of the clay is, to make the other substances cohere together, and to attach them more strongly to the grain.

When the mixture of grain and manure is dry, it is broken up with the hand and thrown upon a fine sieve, which allows the loose powder to pass through and the uncovered grains, and then upon a coarser sieve, through which the dressed seeds pass, leaving the lumps, in which two or three seeds may be present, and which are to be carefully broken up. He prescribes further, that much caution is to be used in completing the operation so quickly that the grain may not be permitted to sprout, and thus become liable to injury during the succeeding operations.

When it is wished to grow corn after corn in fields manured in the usual way, Victor recommends mixing, for each bushel of seed, two to three pounds of sal-ammoniac, or four to six pounds of common salt with ten to fifteen of rye-meal, adding a little water, stirring the seed well among it, and drying the whole in a stove.

Such is the substance of Victor's pamphlet and observations. I have stated them pretty fully, because I think he deserves this much at the hands of those who are interested in the progress of practical agriculture; because he has stated the reasons for his procedure, has described his processes fully, and claims neither great merit nor great reward for alleged great discovery. Besides, there is a show of reason in what he states. For though we may very fairly doubt, or perhaps entirely disbelieve, that the quantity of manure with which he envelops his seeds can be sufficient to supply the wants of the crop that

is to spring from them, yet there can scarcely be a more economical way of employing the same quantity of manure—one in which there will be less waste of it, or in which it will be more useful to the growing plant. In every way of applying manure to the soil which has hitherto been adopted, a large portion never reaches the roots of the plants. Even when drilled in along with or near the seeds, a notable quantity escapes from the neighbourhood of the roots, and is more or less completely lost to the crop it is intended to feed. Such must obviously be the case to a very much smaller extent where it is in actual contact with the seed it is to nourish, and actually envelopes it.

Still it is doubtful whether the gain or saving effected by this method will be equal to the cost of time and labour which it involves. Should such a mode of manuring be found easily practicable, more skilful mixtures than those of Vietor—such as would be more certain to succeed, and such as would be fitted specially to aid the growth of this or that kind of crop—could easily be suggested.

In illustration of this opinion, I will here briefly state the facts from which I am led to believe that considerable benefit may in reality hereafter accrue to practical agriculture from a careful study of the effect of certain known steeps or prepared mixtures upon the after-growth of the seeds upon which they have been tried.

1. The quantity of inorganic matter contained in the grain of wheat, oats, barley, &c., is comparatively small. In wheat and barley it varies from $1\frac{1}{2}$ to 2 per cent. of the whole weight; in oats it is about $3\frac{1}{2}$ per cent., but a considerable proportion of this is contained in the husk with which the oat is usually invested. But, though small in quantity, this inorganic matter is absolutely essential to the perfect condition of the seed, and to the healthy growth of the plant that springs from it.

2. When seeds are steeped in water, they swell and increase in bulk. They absorb a portion of the water and of any saline substances it may hold in solution. Now, if the small quantity of saline or inorganic matter which exists in seeds does really promote their growth, may not a larger quantity promote it more? May not the growth be more luxuriant if the seed be steeped in water containing saline substances in solution, and be thus made to absorb an additional proportion? It does not appear unreasonable to suppose that a bushel and a-half of seed-wheat may be made to absorb a pound of saline matter. This appears, indeed, to be only a very small quantity, and yet, if absorbed, it would add one-half more to that which the seed naturally contains. We cannot pronounce beforehand, with absolute certainty,

that by this absorption the growth of the seed would be greatly promoted, though both theory and practice concur in rendering it probable. Thus the experiments of Bickes—whose mode of preparing seeds appears to be a simple steeping in saline solutions—appear decisive in favour of the opinion that such artificial additions to the saline matter of the seed do really, in some cases at least, greatly promote the growth of the seeds, and increase the luxuriance and produce of the after crops.

The fact that saline manures are beneficial, in many cases, to the growing crop, when merely applied to the soil, is in favour of the same view. The salts, it is true, when applied to the soil, enter the plant by its roots, but, nevertheless, their action is simply to yield saline matter to the plant in larger quantity than it could otherwise readily obtain it from the soil. This additional supply might at once be given it, to a certain extent, by steeping the seed itself.

3. Further, we know that some seeds germinate much more readily and certainly than others. We know, also, that the proportion of inorganic matter, or of ash they leave when burned, varies in different samples, of seeds of the same kind. That contained by wheat, for example, is sometimes $1\frac{1}{2}$, sometimes $1\frac{3}{4}$, and sometimes nearly 2 per cent. of its weight. Can this difference in the growth of seed and the difference in the proportion of saline matter have any connection with each other? Do some germinate feebly, do others fail entirely, because they contain too small a proportion of the usual saline constituents of the seed? Would they germinate better if more were by some means given to the seed? The same experiments of Bickes, upon the effect of steeping, seem almost to answer these questions in the affirmative; they, at least, render it very probable that some such relation does exist between the two differences to which I have alluded. The same may also be said of the observation made by Mr. Fleming of Barochan, that seed wheat, which had been dressed the previous year, with certain saline substances, grew more luxuriantly, and gave a better crop than that which, though grown on the same field, had not been so top-dressed. It is not very unreasonable to suppose that this better growth of the dressed seed might be owing to its having obtained, from the substances applied to the soil, a larger proportion of saline matter than that to which no top-dressing had been applied.

Still these circumstances only render probable the opinion to which I have adverted. They point out, however, new series of researches, both in the field and in the laboratory, by which the opinion will be tested, and either refuted or confirmed. In the field, experiments must be made with different seeds, dressed and undressed. In the labora-

terry these seeds must be examined, the proportion of inorganic matter they respectively contain determined, and if this inorganic matter be equal in quantity in seeds exhibiting different powers of germination and growth, the difference in the kind or quality, as well as in the quantity of the ash, must be more or less rigorously ascertained. By these united methods of investigation, we may hope, by and bye, to make out what are likely to be the real and constant effects of steeping upon seeds—to what kind of seeds or roots it may be applied most beneficially—under what circumstances this treatment ought to be especially adopted—what kind of saline substances ought to be applied to each species of seed, and in what proportions—and what is the nature of the influence they may be found to exercise in promoting or otherwise modifying the growth of the after crop.

In the meantime, there are two principles by which our trial of steeps ought to be regulated, by which the saline substances we may employ with advantage in our first experiments in the field and upon different crops are distinctly pointed out. In a future paper I shall explain these principles, and state the practical suggestions which may be drawn from them in regard to experiments upon the steeping of roots and seeds.—*Journal of Agriculture, for January, 1844.*

DURHAM, 20th November, 1843.

General Catalogue of Plants in the Honourable Company's Botanic Garden, Calcutta.

(Continued from page 535.)

Malvaceæ.—Continued.

Hibiscus mutabilis, × ‡
 „ *scandens*, ‡
 „ *chinensis*, ‡
 „ *tricuspis*, × ‡
 „ *surattensis*, ‡
 „ *diversifolius*, ‡
 „ *bluflores*, × ‡
 „ *Sabdariffa*, ‡
 „ *radiatus*, × ‡
 „ *longifolius*, ‡
 „ *tetraphyllus*, ‡
 „ *Trionum*, ‡
 „ *sulphureus*, ‡
 „ *cannabinus*, × ‡

Malvaceæ.—Continued

Abelmoschus moschatus,
 „ *ficulneus*, ‡
 „ *longifolius*, ‡
 „ *pentaphyllus*, ‡
Decaschista crotonifolia,
Paritium tilaceum,
 „ *Bealeri*, ×
 „ *sp.*
Gossypium obtusifolium, ‡
 „ *arboreum*, ‡
 „ *herbaceum*, ‡
 „ *religiosum*, ‡
 „ *vitifolium*, ‡
 „ *acuminatum*, × ‡
 „ *barbadense*, × ‡

ELÆOCARPEÆ.

- Elæocarpus aristatus*, ‡
 „ *serratus*, X ‡
 „ *rugosus*, ‡
 „ *longifolius*, ‡
 „ *lucidus*, X ‡
 „ *sp.*
 „ *sp.*

DIPTEROCARPEÆ.

- Hopsea laginea*, X ‡
 „ *odorata*, X ‡
Shorea robusta, X ‡
Dipterocarpus alatus, ‡
 „ *turbinatus*, ‡

TILIACEÆ.

- Corchorus olitorius*, ‡
 „ *fascicularis*, ‡
 „ *fuscus*, ‡
 „ *decemangularis*, ‡
 „ *trilocularis*, ‡
Triumfetta ovata, ‡
 „ *Bartramia*, ‡
 „ *oblonga*, ‡
 „ *trilocularis*, ‡
Grewia columnaris, X ‡
 „ *microstemma*, X ‡
 „ *oppositifolia*, X ‡
 „ *floribunda*, X ‡
 „ *asiatica*, X ‡
 „ *pilosa*, ‡
 „ *occidentalis*, X ‡
 „ *polygama*, ‡
 „ *viminea*, X ‡
 „ *sepiaria*, X ‡
 „ *sapida*, ‡
 „ *sclerophylla*, ‡
 „ *umbellata*, ‡
 „ *abutilifolia*, X ‡
 „ *Microcus*, ‡
 „ *paniculata*, ‡
 „ *ovalifolia*, ‡
 „ *tomentosa*, X ‡
 „ *didyma*, ‡
 „ *denticulata*, ‡
 „ *humilis*, X ‡
 „ *aspera*, ‡

TILIACEÆ - continued.

- Berrya Amnilla*, X ‡
Brownlow celata, X ‡

LYTHRARIÆ.

- Ammannia vesicatoria*, ‡
 „ *octandra*, ‡
 „ *multiflora*, ‡
Hemina mytilifolia, X ‡
Gnoria americana,
Lawsonia inermis, X ‡
Grislea tomentosa, X ‡
Lagerstemma elegans,
 „ *indica*, X ‡
 „ *Regina*, X ‡
 „ *macrocarpa*, X ‡
 „ *parviflora*, X ‡
Durabanga sonneratioides, X ‡

MELIACEÆ.

- Quivisia heterophylla*, X
Turroea pinnata,
Melia Azederach, ‡
 „ *composita*, X ‡
 „ *robusta*, X ‡
 „ *sempervirens*, X ‡
Azedarachta indica, ‡
Mallee Rothii, X ‡
Amora Rohitoka, X ‡
 „ *cuculata*, X
Milnea edulis, ‡
Walsura piscidia, X ‡
Monocylis robusta, ‡
Epicharis exarillata, X ‡
 „ *mollis*, X ‡
Sandoricum indicum, X ‡
Ekebergia integerrima, ‡
 „ *indica*, ‡
Heynea trijuga, X ‡
 „ *quinquejuga*, ‡
Guarea mollis, ‡
Aglais odorata, X ‡
 „ *spectabilis*, ‡
 „ *undulata*,
 „ *Careyana*, X ‡
Cedrela Toona, X ‡
Swietenia Mahagoni, X ‡
 „ *febrifuga*, X ‡

MELIACEAE.—Continued.

- Swietenia* *Chitassia*, ‡
Chloroxylum, × ‡

AVRANTACEÆ.

- Atalantia* *pubigera*,
 „ *monophylla*, ‡
Triphasia *trifoliata*, ‡
Limonia *alternans*, ‡
 „ *caudata*, ‡
 „ *acidissima*, ‡
Cookia *punctata*, ‡
Muraya *exotica*, ‡
 „ *sumatrana*, ‡
Bergera *Koenigii*, ‡
Micromelum *integerrimum*, ‡
Clausena *nana*, ‡
 „ *suffruticosa*, ‡
 „ *punctata*, ‡
 „ *sumatrana*, ‡
 „ *heptaphylla*, ‡
Glycosmis *citrifolia*, ‡
 „ *pentaphylla*, ‡
 „ *oxyphylla*, ‡
 „ *tetraphylla*, ‡
Feronia *Elephantum*, × ‡
Ægle *Marmelos*, × ‡
Citrus *acida*, × ‡ II varieties,
 „ *medica*, × ‡
 „ *Aurantium*, ‡
 „ *decumana*, × ‡
 „ *Banksii*, ‡
Luvunga *scandens*, × ‡
Sclerostylis *atalantioides*, × ‡

SPONDIACEÆ

- Poupartia* *axillaris*, × ‡
 „ *Mangifera*, × ‡
 „ *acuminata*, ‡
 „ *dulcis*, × ‡
 „ *longifolia*, × ‡
 „ *lutea*, ‡
 „ *borbonica*,
Shakua *excelsa*.

RHAMNEÆ.

- Zizyphus* *trinervis*, ‡

RHAMNEÆ.—Continued.

- Zizyphus* *hamosus*, × ‡
 „ *latifolius*, ‡
 „ *flexuosus*, ‡
 „ *Jujuba*, × ‡
 „ *vulgaris*, × ‡
 „ *glabra*, × ‡
 „ *Caracatta*, × ‡
 „ *Nepetta*, ‡
 „ *incurva*, ‡
Bechemia *floribunda*, ‡
Ventilago *madraspatana*, × ‡
 „ *sp.*
 „ *sp.*
Rhamnus *virgatus*, ‡
 „ *circumscissus*, ‡
 „ *lucidus*, ‡
Hovenia *dulcis*, × ‡
Colubrina *asiatica*, × ‡
 „ *napalensis*, × ‡
Gouania *leptostachya*, × ‡
 „ *madagascariensis*, × ‡

CHAULLETIACEÆ.

- Chauletia* *erecta*,

BURSERACEÆ.

- Boswellia* *serrata*, × ‡
Canarium *commune*,
 „ *strictum*,
 „ *geniculatum*,
Luca *indica*, × ‡
Balsamodendron *Commiphora*, ×
 „ *Roxburghianum*, ×
Sorindeia *madagascariensis*, × ‡
Garuga *pinnata*, × ‡
 „ *madagascariensis*,

EUPHORBIACEÆ

- Sarcococca* *prunifolia*, ×
Buxus *sempervirens*,
Securinega *borbonica*,
Cicca *disticha*, × ‡
Emblia *vulgaris*, × ‡
Kirganchia *elegans*, ‡
Xylophylla *angustifolia*,
Phyllanthus *Juniperi*,

EUPHORBACEÆ, —Continued.

- Phyllanthus cordatus*,
 simplex, ‡
 obcordata, ‡
 retusus, × ‡
 Leucopyrus, ×
 Niruri, ‡
 Simsianus, ‡
 Arenaria, ‡
 multiflorus, × ‡
 incanus, ‡
 reticulatus, ‡
 laeobotryoides, ×
 patens, × ‡
 reclinatus, ×
 tetrandrus,
 cerasifolius,
 juniperinus, ×
Andrachne trifoliata, × ‡
Clusia collina, × ‡
 semperflorens, ‡
 oblongifolia, × ‡
 spinosa, ‡
 scandens, ‡
Bradleya multilocularis, × ‡
 nitida, × ‡
 hirsuta, ‡
 sinica, ×
Briedelia attenuata, × ‡
 amœna, × ‡
 Berryana, × ‡
 lanceafolia, × ‡
Croton variegatum, ×
 latifolium, ×
 Tiglium, × ‡
 oblongifolium, × ‡
 elæocarpifolium, × ‡
 polyandrum, × ‡
 urophyllum,
 lepidotum,
 drupaceum, × ‡
 lævigatum, ×
 bineurosus,
 punctatum,
 iliciodorum, ×
 rubrum, ×
Hæmatospermum nerifolium, ‡
Jatropha Curcas, ‡
 multifida, × ‡
 glandulifera, ‡

EUPHORBACEÆ, —Continued

- Jatropha caribæa*, × ‡
 pedunculifolia,
Jatropha Manihot, × ‡
 Yuquilla, × ‡
Rottlera tinctoria, × ‡
 barbata, ‡
 tugosa, ‡
 dicocca, × ‡
 alba, ‡
 pterococca, ‡
 peltata, ×
Gouania nerea,
Gelonium fasciculatum, ×
 osifarium, × ‡
 lanceolatum, ‡
Ruellia communis, × ‡
 Mappa,
 dicoccus, ×
Eleocharia vernicosa,
Alecanites triloba, ×
 intaphylla, ‡
Anda Gomesu, ‡
Acalypha indica, ‡
Plukenetia corallulata,
Tragia Chamælea, ‡
 colorata, ‡
 involverata, ‡
Sapium indicum, × ‡
 sebiferum, × ‡
 baccatum,
 cordifolium, ×
 lineatum,
Hura crepitans, × ‡
Excoecaria Agallocha, × ‡
Dalechampia madagascariensis, ‡
Euphorbia Antiquorum, × ‡
 bovifolia, ×
 arborescens,
 lactea, ‡
 trigona, ‡
 nerifolia, ‡
 pyrifolia, ‡
 ligularia, ‡
 Tirucalli, ×
 hirta, ‡
 thymifolia, ‡
 Chamæsyce, ‡
 punicea, ‡
 prunifolia, ‡

EUPHORBIAEÆ.—Continued.

- Euphorbia* Boyeri, X ‡
 , terracina, ‡
 , splendens, X ‡
 , jacquiniiflora,
Pedilanthus tithymaloides, X ‡
 , carinatus,
Xeroglottis fragrans,
Trewia nudiflora, ‡
 , atroviridis.

CELASTRINEÆ

- Euonymus garcinifolius*, X ‡
 , lanceolatus,
 , scandens, X
 , bullatus,
 , Hamiltonianus, X
 , glaber, X
 , grossus,
Celastrus fascicularis, X
 , pallidus,
 , montanus, X
 , oblongus, X
 , verticillatus, ‡
 , nutans, X ‡
 , trigynus, X
 , buxifolius,
 , stylosus, X
 , rufus, X
 , multiflorus, ‡
Elæodendron orientale,
 , glaucum, X ‡
Hippocratea indica, X ‡
 , obtusifolia, X ‡
 , arborea, X
 , viminea, X
 , sp.
Salacia longifolia, X ‡
 , primoides, X ‡
 , acuminata, ‡
 , Roxburghii, ‡
 , celastrifolia.

STAPHYLEACEÆ.

- Dalrymplea pomifera*, X

MALPIGHIACEÆ

- Malpighia coccifera*, ‡
 , punicifolia, X ‡

MALPIGHIACEÆ.—Continued.

- Byisonima lucida*, X ‡
 , pulcherrima, ‡
Hiptage racemosa, X ‡
 , obtusifolia, X ‡
Thryallis biachystachys,
Gaydichaudia granitica, X
Hiræa nutans, X ‡
 , hirsuta, X ‡
 , napalensis, X ‡
Banisteria laurifolia,
Heteropteris argentea,
Stigmaphyllon aristatum
Erythroxylum monogynum, X
 , longifolium,
 , hypericifolium, X
 , buxifolium,
 , laurifolium,
 , lanceifolium.

PORTULACÆÆ

- Portulaca oleracea*, ‡
 , meridiana, ‡
 , pilosa, ‡
Caffia,
Talinum patens, ‡

CARYOPHYLLÆÆ

- Dianthus Caryophyllus*,
 , paniculatus,
 , suaveolens,
 , chinensis, ‡
 , petreus,
 , barbatus,
 , superbus,
 Plumieri,
Saponaria officinalis, ‡
Stellaria triandra.

ILLECEBREÆÆ.

- Pharnaceum Mollugo*, ‡
 , pentagynum, ‡
Mollugo Spargula, ‡

TANAFISCINEÆ.

- Tanais indica*,
 dioica, X

OCHNACEÆ.

Ochna squarrosa, × ‡
 , *stipulacea*, ×
Gomphia angustifolia.

SIMARUBEÆ.

Quassia amara,
Samadera indica

RUTACEÆ.

Ruta graveolens, ×
 , *albiflora*, ‡
Caymosina Reevesii, ‡
 , *pedunculatum*, ‡

ZYGOPHYLLÆ.

Tribulus lanuginosus, ‡
 , *cistoides*, ‡
Guaiacum officinale, ×

NANTEMPELÆ.

Brucea mollis, ‡
 , *sumatrana*, × ‡
Xanthoxylum undulatum, ×
 , *Budrunga*, × ‡
 , *nitidum*, ×
Toddalia floribunda, ×
 , *capparidea*,
 , *aculeata*, ×
Fagara triphylla,
 , *austialis*,
Ailanthus excelsus,
 , *eglandulosus*,

GERANIACEÆ.

Geranium napalense, × ‡
Erodium moschatum, × ‡
Pelargonium cucullatum,
 , *Radula*,
 , *capitatum*,
 , *obatum*,
 , *Malcolmii*, >
 , *crassipes*, ×

R. SCARFINÆ.

Impatiens B. samina, ‡
 , *evigata*, ‡
Hytrocera triflora, ‡

TROPAEOLÆ.

Tropeolum pentaphyllum,
 , *majus*.

OXALIDEÆ.

Averrhoa Caribbola, × ‡
 , *Pilumbi*, × ‡
Oxalis corniculata, ‡
 , *sensitiva*, ‡
Depperi,
calina,
cernua,
variabilis v. *albiflora*.

CORIARIÆ.

Coriaria nepalensis, ‡

ROSACEÆ.

Rosa multiflora, ×
 , *indica*,
 , *rubiginosa*,
centifolia,
 , *chinensis*, ‡
 , *sempervirens*, ×
 , *caroliniana*,
 , *glandulifera*,
 , *involucrata*, × ‡
 , *microphylla*,
 , *procumbens*, ×
 , *Bartoniiana*,
 , *canina* v. *borbonica*
Rubus hexagonus,
 , *albescens*,
 , *rosifolius*, ×
 , *paniculatus*, ‡
Fragaria indica, ‡
 , *vesca*, ‡
Agrostonia nepalensis,
Kernia japonica, ×
Spirea Roxburghii, ×
Crategus crenulata, ×

ROSACEÆ,—Continued.

- Cratægus glauca*,
Rapholepis indica, ✕
Photinia eugenifolia,
 , *japonica*,
 , *benghalensis*, ✕ ‡
Pyrus communis,
 , *chinensis*,
Cotoneaster affinis,
Pygeum acuminatum,
Prunus armeniaca,
 , *violacea*,
 , *caroliniana*,
 , *Puddum*, ✕
 , *triflora*,
Amygdalus Persica, 12 var ‡
Cerasus Jenkinsii ‡

LEGUMINOSÆ

- Sophora tomentosa*, ✕ ‡
 , *glauca*, ✕ ‡
 , *occidentalis*, ✕ ‡
 , *japonica*, ‡
 , *Hopeana*, ‡
Edwardsia madraspatana, ‡
 , *grandiflora*, ‡
Ormosia dasycarpa, ✕ ‡
Virgilia aurea, ‡
 , *latifolia*, ‡
 , *sericea*, ‡
Crotalaria grandis, ‡
 , *junceæ*, ‡
 , *vasculosa*, ‡
 , *tenuifolia*, ‡
 , *tetragona*, ‡
 , *stricta*, ‡
 , *fulva*, ‡
 , *pulcherrima*,
 , *retusa*, ‡
 , *verrucosa*, ‡
 , *biolata*, ‡
 , *cuspidulata*, ✕
 , *cytisoides*, ‡
 , *uncinella*, ‡
 , *elliptica*, ‡
 , *laburnifolia*, ✕ ‡
 , *Trifolium*,
 , *violacea*, ‡
 , *pulchella*, ‡

LEGUMINOSÆ,—Continued.

- Crotalaria capensis*, ‡
 , *quinquefolia*, ‡
 , *incana*, ‡
 , *striata*, ‡
 , *Boroni*, ‡
 , *pilosa*, ‡
Sytisus Cajan, ‡
Medicago ciliata, ‡
 , *lapacea*, ‡
Trigonella corniculatum, ‡
 , *Fænum Græcum*, ‡
Trifolium indicum, ‡
 , *officinale*, ‡
Lotus jacobæus, ‡
 , *cyathiferus*,
 , *corniculatus*, ‡
Psoralea corylifolia, ‡
 , *speciosa*, ‡
Indigofera linifolia, ‡
 , *ornata*, ‡
 , *Brunoniana*,
 , *polygonata*, ‡
 , *argentea*, ‡
 , *fragrans*, ✕
 , *heterantha*, ✕
 , *hirsuta*, ‡
 , *viscosa*, ‡
 , *tinctoria*, ✕
 , *atropurpurea*, ✕ ‡
 , *virgata*, ✕ ‡
 , *violacea* ✕ ‡
 , *sp.* ✕
Clitoria Ternatea, ✕ ‡
 , *brasiliensis*, ✕ ‡
 , *Plumeri*, ✕
Galactia erecta, ‡
Pueraria tuberosa, ✕ ‡
Glycine debilis, ‡
 , *involucrata*, ✕ ‡
 , *labialis*, ‡
 , *pentandra*, ✕ ‡
 , *Wightii*, ‡
 , *Backhousiana*,
Wisteria sinensis,
Galga pentaptera, ‡
 , *villosa*, ‡
Tephrosia coccinea, ‡
 , *urophylla*, ‡
 , *tinctoria*, ‡

LEGUMINOSÆ.—Continued.

- Tephrosia amœna*, ‡
 purpurea, ‡
Amorpha fruticosa, ‡
 herbacea, ‡
Robinia suberosa, ‡
 candida, × ‡
 tinctoria, ‡
 racemosa, × ‡
 fruticosa, × ‡
 macrophylla, × ‡
 pulchella, ×
Robinia paniculata, ‡
 Pseudacacia, ‡
 sp.
Agati grandiflora,
*Ornocarpum semnoide*s, ‡
Æschynomene *Sesban*, ‡
 cannabina, ‡
 procumbens, ‡
 uliginosa, ‡
 aspera, ‡
 seabra, ‡
 paludosa, ‡
 spirosa,
Smithia sensitiva, ‡
Lourea Vespertilionis, ‡
Uaria retrofracta, ‡
 cordata, × ‡
 campanulata, × ‡
 floribunda, ‡
 hamosa, ‡
 crinita, ‡
Desmodium purpureum, ‡
 paniculatum, × ‡
 gyroides, × ‡
 ancistrocarpum, ×
Dicerma pulchellum, × ‡
Pseudarthria viscida, × ‡
Hedysarum Alhaji, ‡
 virgiale, ‡
 barbatum, ‡
 amœnum, ‡
 triquetrum, ‡
 alatum, × ‡
 gangiticum, ‡
 latifolium, × ‡
 gyrans, × ‡
 movens, ‡
 bisputorianum, ‡

LEGUMINOSÆ.—Continued.

- Hedysarum diphyllym*, ‡
 triflorum, ‡
 reptans, ‡
 lycopodioides, ‡
 formosum, ‡
 cephalotes, ‡
 pulchellum, ‡
 Gentium, ‡
 guaroides, ‡
 notans, ‡
 pictum, ‡
 umbellatum, ‡
 leguminum, ‡
 pendulum, ‡
Peromanga Chapai, × ‡
 nanua, × ‡
 congesta, × ‡
 stricta, ‡
 semialata, × ‡
 strobilifera, × ‡
Cicer Lens, ‡
 arietinum, ‡
Vicia sativa, ‡
Pisum sativum, ‡
Lathyrus Aphaca, ‡
 sativus, ‡
Abrus precatorius, × ‡
Kennedyia monophylla,
Phaseolus fuscus, ‡
 alatus, ‡
 sublobatus, ‡
 calcaratus, ‡
 lunatus, ‡
 radiatus, ‡
 psotaleoides, ‡
 Max, ‡
 Mungo, ‡
 aureus,
 trilobus, ‡
Rhynchosia minima, ‡
Canavalia gladiata, × ‡
 virosa, × ‡
Dolichos speciosus, ‡
 rotundifolius, ‡
 Catjang, ‡
 tetragonolobus, ‡
 hignosus 7 var. ‡
 incanus, ‡
 gangeticus, ‡

LEGUMINOSÆ.—Continued.

- Dolichos glutinosus*, ‡
 brachystachys, ‡
 molissimus, ‡
 scarabæoides, ‡
 ferreoloides, ‡
 vex illatus, ‡
Mucuna pruriens, ‡
 urtilis, ‡
Carpopogon niveus, ‡
 gigantus, ‡
 bracteatus, ‡
 angustus, ‡
Cylista scariosa, × ‡
Erythrina indica, × ‡
 stricta, ‡
 ovalifolia, ‡
 suberosa, ‡
 arborescens, × ‡
 herbacea, × ‡
 glauca, × ‡
 casta, × ‡
 sp.
Butea parviflora, × ‡
 superba, × ‡
 frondosa, × ‡
 tetraptera, ‡
Pongamia glabra, × ‡
 heterocarpa, ‡
 sericea, × ‡
 serassifolia, ‡
 multijuga, ‡
 ubiginosa, ‡
 ferruginea, × ‡
Galedupa elliptica, × ‡
 marginata, ‡
Dalbergia oojimensis, × ‡
 latifolia, × ‡
 glauca, ‡
 Sissoo, × ‡
 frondosa, × ‡
 paniculata, ‡
 zeylanica, ‡
 robusta, × ‡
 marginata, × ‡
 scandens, × ‡
 tamarindifolia,
 rumosa, × ‡
 spinosa,
 sympathetica, ×

LEGUMINOSÆ.—Continued.

- albergia* sp.
terocarpus santalinus,
 Marsupium, × ‡
 Galbergioides, × ‡
 indicus, × ‡
 his hypogæa, ‡
editschia triacantha, × ‡
amnocladus canadensis, ×
nlandina Bonduc, × ‡
 Bonduccella, ‡
Cesalpinia Sappan, × ‡
 digyna, ×
 cucullata, × ‡
 immosoides, ×
 sepiaria, × ‡
 paniculata, × ‡
 chinensis,
 tortuosa, × ‡
 Coriaria, × ‡
 punctata,
 sp.
Ponciana pulcherrima, × ‡
 Gilliesii, ‡
 elata, × ‡
 regia, × ‡
Parkinsonia aculeata, ‡
Ceratonia Siliqua, ×
Hamatosylum campechianum, × ‡
Hardwickia binata, ×
 pinnata, ‡
Jonesia Asoca, × ‡
Colvillea racemosa,
Amherstia nobilis,
Tamarindus indica, × ‡
 occidentalis, ‡
Cassia attenuata, ‡
 baccularis, ‡
 Tora, ‡
 bicapsularis, ‡
 purpurea, ‡
 occidentalis, ‡
 Fistula, × ‡
 lanceolata, ‡
 Sophora, ‡
 florida, × ‡
 nodosa, × ‡
 auriculata, ×
 javanica, × ‡
 alata, ‡

LEGUMINOSÆ.—Continued.

- Cassia* *marginata*, × †
 glauca, × †
 marylandica, †
 brasiliensis, × †
 Chamaecrista, †
 dimidiata, †
 hirsuta, × †
 biflora, × †
 Wrightiana, †
 palmistipula, × †
 fulgens, × †
 • *Schottia* *speciosa*
 latifolia,
Cynometra *polyandra*, × †
 cauliflora, †
Outrea *biguga*, × †
Hymenoclea *Coultard*, × †
 verrucosa, †
Bauhinia *Richardiana*, × †
 variegata, †
 emarginata, × †
 candida, †
 purpurea, × †
 triandra, × †
 parviflora, †
 microphylla, × †
 persecta, × †
 Vahlii, × †
 acuminata, †
 tomentosa, × †
 anguina, × †
 corymbosa, ×
 semitrinda,
 malabarica,
 Lingua, × †
 brachycarpa, × †
 polycarpa, × †
 diphylla, × †
 piperifolia, ×
 aurantiacea,
 madagascariensis,
 speciosa, × †
Cercis *Silquastrum*,
Castanospermum *australe*,
Eufada *madagascariensis*,
 Purshiana, × †
 polystachya, × †
 pudica, × †
 octandra, × †

• LEGUMINOSÆ.—Continued.

- umbellata*, × †
 erectiva, × †
 esperata, × †
 na Richardiana,
 brunnea, × †
 glandulosa, × †
 locurpa, †
 gemina, × †
 gu-Cati, × †
 vis, × †
 obesa,
 brisa,
 grossa, × †
 obesa, × †
 indeterminata,
 oma brachyloba,
 hus triquetra, †
 nabata,
 punctata, †
Adenanthos *pavonina*, × †
 falcata, × †
Prosopis *spaciosa*, × †
Acacia *mollis*, †
 Spissa, × †
 speciosa, †
 coloratissima, † †
 elata, × †
 Wrightii, †
 Suma, †
 amara, †
 Smithiana, × †
 Coleyana, †
 stipulata, × †
 myriophylla,
 Arabica, × †
 leucophylla, × †
 tomentosa, †
 dumosa, †
 ferruginea, †
 Catechu, × †
 Sundra, × †
 glauca, × †
 aspera, †
 rugata, × †
 diluta, × †
 pennata, × †
 caesia, †
Dichrostachys *cincta*, × †
Vachellia *farnesiana*, × †

LEGUMINOSÆ, 4—Continued.

Leguminosæ indeterminatæ: 2

CONNARACEÆ.

Connarus nitidus, × ‡

, igneus.

, sp.

, sp.

Cnestis monadelphæ. ‡

CHRYSOBALANÆ.

Chrysobalanus Icaco, × ‡

Parinari Matoma.

, Porterianum,

Prinsepia utilis. ×

CALYCANTHÆ.

Calycanthus florida, ×

, præcox.

SAXIFRAGÆ.

Hydrangea mutabilis

Saxifraga ligulata.

GRASSULACI.

Kalanchoe tomentifolia, × ‡

, laevis, × ‡

, spathulata, × ‡

, virens, × ‡

Bryophyllum calycinum, × ‡

Sedum cuneatum,

, oxyphyllum.

AMYRIDÆ.

Amyris punctata, × ‡

Sabia lanceolata,

, limbofolia. ×

ANACARDIACÆ.

Anacardium occidentale, × ‡

Semecarpus Anacardium, × ‡

, humilis, ×

, Cassavium,

ANACARDIACÆ, —Continued.

Semecarpus cuneifolia, × ‡

, acuminata, × ‡

Holigarna racemosa,

Mangifera indica, × ‡

, acuminata,

, oppositifolia, × ‡

, sylvatica,

Buchanania latifolia,

, angustifolia,

Melanorrhæa usitata × ‡

Pistacia Lentiscus,

Rhus Toxicodendron, ×

, venita, ×

, Buckiamela, × ‡

, juglandifolia, ‡

, lucida.

, parviflora,

, paniculata, ‡

, zangibariensis, ×

, mysorensis,

, sp.

Phlebochiton extensus, × ‡

Odina Wodier, ‡

Schinus terebinthifolius. ×

CUPULIFERÆ.

Quercus Ægilops,

, virens,

Castanea indica, ×

, tribuloides.

SCERIFRAGÆ.

Lepidostachys Roxburghii. ×

URTICÆ.

Urtica scabrella, × ‡

, smilacifolia, ×

, subperforata, ×

, alienata, ×

, tuberosa, × ‡

, pentandra, ‡

, interrupta, ×

, coronulata,

, involucrata, ‡

, fenacissima, ‡

, naucleiflora, ×

URTICÆA, —Continued.

- Urtica* hastilis,
- , biloba,
- , photinophylla,
- , nivea. X
- , macrostachya, X ‡
- Borhmeria* viminea, X
- Pteris* punctata,
- Canabis* sativa, ‡
- Antiaris* toxicaria,
- Morus* indica,
- , levigata,
- , nigra,
- , difaria,
- , atropurpurea, ‡
- , rubra,
- , indica v. alba,
- , — v. multicaulis,
- , scandens, X
- Broussonetia* papyrifera, X ‡
- Ampelis* madagascariensis, X ‡
- Ficus* Carica, X ‡
- , pilulifera, X ‡
- , hirsuta, ‡
- , erythrophylla,
- , biglandulosa
- , rugata, ‡
- , bullata, ‡
- , hirta, X ‡
- , scabrida,
- , heterophylla,
- , albinervis, X
- , artocarpifolia,
- , mangifolia, X
- , auriculata,
- , repens,
- , elastica, X
- , indica, X ‡
- , religiosa, X ‡
- , pisifera, X ‡
- , cordifolia, X ‡
- , infectoria, X ‡
- , exelsa, X ‡
- , urophylla, X ‡
- , laccifera, X ‡
- , macrophylla, ‡
- , nitida, X ‡
- , lanceolaria, X ‡
- , glomerata, X ‡
- , conglomerata, ‡

URTICÆA, —Continued.

- , us congesta, ‡
- , aurantifolia,
- , terebrata,
- , sp
- , stenota Contrayerva, X ‡
- , ocarpus incisa,
- , integrifolia, X ‡
- , Licusha, X ‡
- , Chaplasha, X ‡
- , ochinata, ‡
- , oblonga
- , angustifolia,
- , lura acanthiaca, X
- , Galeu galeu, X
- , sp. n. n.
- , trifida, X ‡
- , aurantiaca, X ‡
- Broussonetia* Alcastium, X
- Galactodon* from Humboldt,
- Trophis* aspera, X ‡
- Urtica* indecorus,

CERATOPHYLLÆÆ.

- Ceratophyllum* verticillatum,

CELTIFERÆ

- Ulmus* virgata,
- , integrifolia, ‡
- Celtis* orientalis, X ‡
- , occidentalis, X ‡
- , tetrandra, X ‡

STILAGINÆÆ

- Stilago* Bumas, X ‡
- , diandra, X ‡
- , lanceolaria,
- , tomentosa, X ‡
- Antidesma* pubescens, ‡
- , rugosum,
- , paniculatum, ‡
- , macrophyllum, X
- , madagascariense,
- Falsonera* Wallichiana, X ‡

MYRICEÆÆ.

- Myrica* sapida,
- Putranjiva* Roxburghii, ‡

JUGLANDÆÆ.	THYMELÆÆ.
Juglans regia, ×	Daphne viridiflora, × †
pterococca, ×	Linostomum decandrum, †
	Jenkinsia assamica, ×
CASUARINÆÆ.	HERNANDIACEÆ.
Casuarina muricata, × †	Hernandia ovigera, × †
equisetifolia, × †	Inocarpus edulis, ×
CHLORANTHÆÆ.	AQUILARIINÆÆ.
Chloranthus erectus, ×	Aquilaria Agallochum, ×
inconspicuus, ×	
SACROGREGIÆ.	PROTEACEÆ.
Houttuynia cordata, ×	Grevillea robusta, ×
PIPERACEÆ.	LAURINÆÆ.
Piper nigrum, ×	Cinnamomum caudatum, × †
cuneifolium, ×	mers, ×
longum, × †	pauciflorum, ×
Betel, †	dulce, ×
Cubeba, ×	glanduliferum, × †
magnoliifolium, ×	albiflorum, ×
pereskifolium, ×	zeylanicum, × †
Chaba, × †	Camphora officinalis, †
	Persea gratissima, †
	Beilschmidtia Roxburghiana, × †
	Cryptocarya floribunda, × †
	Laurus nitida, × †
	nobilis, ×
	Parthenoxylon, ×
	cupularis, ×
	Tetradenia toliosa, ×
	umbrosa, ×
	Tetranthera nitida, †
	angustifolia, †
	Roxburghii, × †
	bifaria, × †
	monopetala, †
	quadriflora, †
	macrophylla, ×
	glauca, ×
	Litsea chinensis, †
	Ocotea glaucescens, ×
	lanceolaria, ×
	molis, ×
	Cassytha filiformis, †
ELÆAGNÆÆ.	
Elæagnus dulcis, × †	
triflorus, †	
confertus, × †	
ferrugineus, × †	

TITIGERBÆ.

Cyclocarpus Jacquini, X ‡

NEPENTHÆ.

Nepenthes distillatoria,

ARISTOLOCHIA.

Aristolochia saccata,

, indica,

, anguicida, X

, latens,

, brasiliensis,

, Clematitis

, trilobata,

, hyperborea,

, sempervirens,

AMARANTHACEÆ.

Amaranthus viridis, ‡

, lividus, ‡

, oleraceus, ‡

, gangeticus, ‡

, lanceafolius, ‡

, atropurpureus, ‡

, melancholicus, ‡

, fasciatus, ‡

, tenuifolius, ‡

, spinosus, ‡

, caudatus, ‡

Celosia argentea, ‡

, cristata, ‡

, cernua, ‡

Achyranthes aspera, ‡

, lappacea, ‡

, alternifolia, ‡

, ferruginea, ‡

, lanata, ‡

, triandra, ‡

Desmochæta velutina, ‡

Deeringia staminea,

, celosioides, X ‡

CHENOPODEÆ.

Spinacia tetrandra, ‡

Beta benghalensis, ‡

Atriplex hortensis, ‡

CHENOPODEÆ. Continued.

Chenopodium album, ‡

, ambrosioides, ‡

Bacella ruora,

, alba, ‡

, condifolia, ‡

Boussingaultia baselloides, X

TETRAGONIAÆ.

Tetragonia extensa, ‡

Sesuvium repens,

PHYTOLACCEÆ.

Phytolacca acinosa,

Rivina levis, X ‡

POLYCONEÆ.

Rumex acutus, ‡

, veccarius, ‡

, uncinatus, ‡

Coccoloba uvifera, X

, excoriata, X

, pubescens,

, macrophylla,

, punctata,

Ceratogonum atriplicifolium, ‡

Polygonum adenotrichum,

, nutans,

, microcephalum, X

, fagopyrum, ‡

, lanatum, ‡

, repens, ‡

, paludosum, ‡

, tomentosum, ‡

, glabrum, ‡

, tenellum, ‡

, aviculare, ‡

, flaccidum, ‡

, pilosum, ‡

NYCTAGINEÆ.

Mirabilis Jalapa, X ‡

Pisonia aculeata,

, villosa, X

, grandis,

, inermis,

NYCTAGINEAE.—Continued

- Boerhaavia repanda*, ‡
 , *procumbens*, ‡
 , *diffusa*, ‡

MENISPERMEAE.

- Menispermum tomentosum*, ×
 , *hirsutum*,
 , *canadense*,
 , *polycarpon*, ‡
 , *laurifolium*, ×
 , *villosum*,
 , *coccubus*, × ‡
Cocculus cordifolius, × ‡
 , *palmatus*, ‡
 , *verrucosus*, × ‡
 , *suberosus*, ‡
 , *triander*, ‡
 , *calophyllus*, × ‡
Tiliacora racemosa, ‡
Clypea Burmanni,
Cissampelos hexandra
 , *convolvulacea*,
 , *glabra*, ‡
 , *hernandifolia*, × ‡
 , *mauritiana*,

LARDIZABALEAE.

- Stauntonia latifolia*.

BREXICEAE.

- Brexia madagascariensis*, × ‡

ERICINEAE.

- Andromeda piperifolia*, ‡

VACCINIEAE.

- Thibaudia setigera*,
 , *variegata*,
Gaylussacia salicifolia,

EPACRIDEAE

- Epacris* sp.

PRIMULACEAE.

- Anagallis arvensis*, ‡

MYRSINEAE.

- Myrsine bifaria*, ×
 , *semiserrata*,
 , *capitellata*, × ‡
Ægiceras fragrans,
Ardisia uvigera,
 , *paniculata*, × ‡
 , *umbellata*, × ‡
 , *humilis*, × ‡
 , *nerifolia*, ‡
 , *colorata*, × ‡
 , *citrifolia*, ‡
 , *pedunculata*, × ‡
 , *floribunda*, ‡
 , *hymenandra*,
 , *solanacea*, ‡
Embelia robusta, ×
 , *nutans*, ×
 , *villosa*
Choripetalum aurantiacum, ×
 , *Reevesianum*, ×
Mesa indica,
 , *macrophylla*, ×
 , *ramentacea*,
 , *memoralis*, ×
 , *Missioni*,
Jacquima ruscifolia,
Theophrasta latifolia,

SAPOTIEAE.

- Achras Sapota*, × ‡
 , *Mimusops*, ‡
 , *sessiliflora*,
 , sp.
Imbricaria borbonica, ‡
Mimusops hexandra, × ‡
 , *Elengi*, × ‡
 , *Kaki*, × ‡
 , *angustifolia*,
 , sp.
Bassia latifolia, × ‡
 , *longifolia*, × ‡
 , *butyracea*, ×
Bumelia Sideroxylon,
Chrysophyllum acuminatum, ‡

SAPOTÆÆ,—Continued

- Chrysophyllum* oblongum,
 , macrophyllum, ‡
 , Canito var., ‡
Sideroxylon inerme, X
 , regium, •

EBENACEÆ.

- Diospyros* vaccinioides, X
 , nigricans, X ‡
 , Kaki, ‡
 , Ebenum,
 , melanoxyton,
 , tomentosa,
 , glutinosa, X ‡
 , Sapota, X ‡
 , racemosa,
 , montana,
 , stricta, X ‡
 , Chloroxyton,
 , grandifolia,
 , lanceæfolia, ‡
 , cordifolia, X ‡
 , calycina,
 , ramiflora,
 , grata,
Maba buxifolia, X ‡
Mabola discolor, X ‡
Royena pubescens,

AQUIFOLIACEÆ.

- Cassine* barbata, ‡
 , excelsa, ‡
Siphonodon celastrineus,

CONVOLVULACEÆ.

- Cuscuta* reflexa, ‡
 , capitata, ‡
Rivea tilifolia, ‡
 , Bona nox, ‡
 , ornata, X ‡
Argyreia floribunda, ‡
 , setosa, X ‡
 , splendens, ‡
 , festiva, X ‡
 , aggregata, X ‡
 , speciosa, ‡

CONVOLVULACEÆ,—Continued.

- Argyreia* argentea, ‡
 , capitata, X ‡
 , cuneata, X ‡
 , Wallichii, X ‡
Quamoclit, vulgaris, ‡
 , phoenicea, ‡
 , coccinea, ‡
Batatas paniculata, ‡
 , cuscoides, ‡
 , edulis, ‡
 , stipulacea, ‡
 , albo-hirsuta,
Pharbitis purpurea, ‡
 , Nilam, ‡
 , hispida, ‡
Calonyction speciosum, ‡
 , muricatum, ‡
 , Pes Capræ, ‡
Ipomœa polyanthes, X ‡
 , dasysperma, X ‡
 , staticefolia, ‡
 , cymosa, X ‡
 , dentata, ‡
 , sessilifolia, ‡
 , tridentata, ‡
 , Turpethum, ‡
 , vitifolia, X ‡
 , sinuata, ‡
 , reptans, ‡
 , lactea, X ‡
 , Wightii, ‡
 , setifolia, X ‡
 , macrorrhiza, X ‡
 , salicifolia, ‡
 , sepriaria, ‡
 , cœrulea, ‡
 , Pes Tigridis, ‡
 , pileata, ‡
 , chryseidis, ‡
 , bifida, ‡
 , Bootii, ‡
 , pendula, X ‡
 , rubens, X ‡
 , straminea, ‡
 , tuberosa, X
 , obscura, X
Jacquemontia hastigera, ‡
Convolvulus fastigiatus, ‡
 , discolor, ‡

CONVOLVULACEÆ,—Continued.

- Convolvulus* *vir bellatus*, ‡
 heptophyllus, ‡
 major, ‡
 visidus, ‡
Aniseia *Rheedei*, ‡
Porana *volubilis*, × ‡
 paniculata, × ‡
Breweria *Roxburghii*, × ‡
Evolvulus *alsinoides*, ‡

POLEMONIACEÆ.

- Caldasia* *heterophylla*, ×

HYDROPIACEÆ.

- Nama* *zeylanica*, ‡

LOBELIACEÆ.

- Lobelia* *radicans*, × ‡
 triangulata, ‡
 Careyana, ‡

SPHENOCLEACEÆ.

- Sphenoclea* *zeylanica*, ‡

SCÆVOLEÆ.

- Scævola* *Taccada*, × ‡

RUBIACEÆ.

- Nauclea* *Cadamba*, × ‡
 microcephala,
 macrophylla, ×
 undulata, × ‡
 parvifolia, × ‡
 cordifolia, ‡
Uncaria *sessilifructus*, ×
Hymenodictyon *excelsum*,
 thyrsiflorum, ×
Manettia *cordifolia*, ×
Mussaenda *frondosa*, × ‡
 macrophylla, × ‡
 corymbosa, × ‡
Oxyanthus *hirsutus*,
Stylocoryne *Weberi*, ×

RUBIACEÆ,—Continued.

- Gardenia* *florida*, × ‡
 carinata,
 coronaria, ‡
 latifolia, × ‡
 arborea,
 lucida, × ‡
 Thunbergii,
 Rothmannia,
 turgida,
 uliginosa, × ‡
 dumetorum, × ‡
 nutans,
 longispina, ‡
 spinosa, ‡
 Randii, ‡
 floribunda,
 densa,
 stricta, ×
 mexicana,
 puberula,
 odorata,
 attenuata,
 coriacea, ‡
Randia *cuneata*, × ‡
 acuminata, × ‡
 Candolleana,
 decussata, × ‡
Giffithia *fragrans*,
Petunga *racemosa*, × ‡
 stricta, ‡
Fernelia *buxifolia*,
Webera *odorata*, ×
 attenuata, ×
 coriacea,
 speciosa, ×
Rondeletia *tinctoria*, ×
 paniculata,
 odorata,
Sipania *sp.*
Dentella *repens*, ‡
Oldenlandia *alata*, ‡
 crystallina,
 biflora, ‡
 triflora, ‡
Orthostemma *roseum*, ‡
Hamelia *patens*, ‡
 ventricosa,
 chrysantha,
Morinda *tinctoria*, ‡

RUBIACRÆ,—Continued.

- Morinda bracteata*, × ‡
 , *exserta*, ‡
 , *angustifolia*,
 , *citrifolia*,
 , *vagans*,
Vangueria spinosa, ‡
 , *macrophylla*, ‡
 , *edulis*, ‡
Guettarda speciosa,
Spermatidictyon azureum, × ‡
 , *suaveolens*, × ‡
Leptodermis lanceolata,
Myonima obovata, × ‡
 , *multiflora*, ×
Lecontea Bojerana,
Pæderia fœtida, × ‡
Canthium parviflorum, × ‡
 , *recurvum*, × ‡
 , *longifolium*,
 , *angustifolium*, ×
 , *floribundum*, × ‡
Chiococca racemosa, ×
Baconia sp.
Ixora coccinea, × ‡
 , *Bandhuca*, × ‡
 , *lanceolaria*, × ‡
 , *stricta*, ×
 , *longiflora*, ‡
 , *alba*,
 , *cuneifolia*, × ‡
 , *brachiata*, × ‡
 , *parviflora*, × ‡
 , *virgata*,
 , *undulata*, × ‡
 , *villosa*, ‡
 , *acuminata*, × ‡
 , *opaca*,
 , *sessilis*,
 , *rosea*, ×
 , *barbata*, ×
 , *incarnata*,
Pavetta indica, × ‡
 , *tomentosa*, × ‡
Coffea arabica, × ‡
 , *benghalensis*, × ‡
 , *tetrandra*, × ‡
Psychotria undata, × ‡
 , *bicornis*, ×
 , *stipulacea*,

RUBIACRÆ, E., Continued

- R. vesu*, × ‡
 , *btusifolia*, ×
Chazalia borbonica,
Spermacoe teres, ‡
 , *lævis*, ‡
 , *tenuior*, ‡
 , *scabra*, ‡
 , *hispida*, ‡
Knoxia verticillata,
Serissa fœtida, ×
Rubiacea indeterminata, ×

CAPRICOLIACÆ

- Lonicera chinensis*, ×
 , *confusa*, ×
 , *Leschenaultii*, ×
Sambucus rubra,
Viburnum polycarpum,
 , *punctatum*, ×
 , *denophyllum*, ×
 , *acuminatum*,

COMPOSITÆ

- Sonchus oxiacensis*, ‡
Prenanthes acaulis,
 , *limifolia*,
 , *procumbens*,
Cichorium Intybus, ‡
Scolymus sp. ‡
Hieracium Wallichii,
Carthamus tinctorius, ‡
Carduus lanatus, ‡
 , *elongatus*, ‡
Serratula carthamoides, ‡
 , *coccinea*, × ‡
Cacalia cylindracea, × ‡
 , *purpurascens*, × ‡
 , *sonchifolia*, ‡
 , *hieracioides*, × ‡
 , *carnosa*, × ‡
Centaurea bracteata, ‡
 , *pratensis*, ‡
 , *nigricans*, ‡
 , *splendens*, ‡
Gynura nepalensis, × ‡
 , *bicolor*, × ‡
Notonia grandiflora, ×

COMPOSITÆ,—Continued.

- Vernonia bracteolata*, ‡
 anthelmintica, ‡
 vagans, × ‡
 bracteata, ‡
Eupatorium Ayer Punna, ×
 divergens, × ‡
 asperum, × ‡
 repandum,
Decaneurum grande, × ‡
Pectis humifusa, ‡
Elephantopus scaber, ‡
Lagascea mollis, ‡
Ageratum cordifolium, ‡
 conyzoides v. mexicana, ‡
 dumosum, × ‡
Aster mutabilis, ‡
 venosus, ‡
 æstivus, ‡
 annuus, ‡
 sp.
Psadia dentata,
Senecio undulatus,
Erigeron asteroides,
Amphirapis intermedia, ‡
Microglossa sessiliflora, × ‡
Spilanthus annuus, ‡
 oleraceus, ‡
Bidens Wallichii, ‡
Artemisia vulgaris, ‡
 lactiflora, ‡
 grata, ‡
 indica, ‡
 parviflora, ‡
 sp.
Chrosostephium artemisioides,
Gnaphalium strictum, ‡
 depressum, ‡
 alboluteum, ‡
 indicum, ‡
Conyza corymbosa, × ‡
 balsamifera, ‡
 laciniata, ‡
 lacera, ‡
 stricta, ‡
 chinensis, ‡
 Sitta ? ‡
Tagetes erecta, ‡
 patula, ‡
Zinnia pauciflora, ‡

COMPOSITÆ,—Continued

- Zinnia multiflora*, ‡
 elegans, ‡
Cosmia sulphurea, ‡
 parviflora, ‡
Chrysanthemum indicum, × ‡
 chinense, × ‡
Pyrethrum frutescens, ‡
Eclipta prostrata, ‡
Verbesina calendulacea, ‡
 scandens, × ‡
 sativa, ‡
Synedrella nodiflora, ‡
Helianthus annuus, ‡
 tuberosus, × ‡
 lævis,
Rudbeckia triloba,
Coreopsis tinctoria, ‡
 coronata, ‡
Balbisia elongata, ‡
Calendula officinalis, ‡
Parthenium Hysterophorus, ‡
Sphaeranthus mollis, ‡
 indicus, ‡
Hingstha repens,
Solidago canadensis,
Dahlia variabilis, ×
Achillea nobilis, ×
 macrophylla,
Xanthium indicum, ‡

DIPSACÆÆ.

- Dipsacus mitis*,

PLANTAGINÆÆ.

- Plantago major*, ‡
 attenuata,
 asiatica, ‡
 ispaghula, ‡

PLUMBAGINÆÆ.

- Plumbago zeylanica*, ×
 rosea, ×
 capensis,

CORDIACEAE.

- Cordia Myxa*, × ‡
 , *Myxa v. Benthamensis*,
 , *tectonæfolia*, ‡
 , *laethfolia*, ‡
 , *Gerascanthus*,
 , *polygama*, ×
 , *reticulata*, × ‡
 , *Sebestena*,
 , *serrata*, ×
 , *grandis*, × ‡
Erycibe pauciflora, ×

EHRETIAEAE.

- Ehretia aspera*,
 , *laevis*, × ‡
 , *buxifolia*, × ‡
 , *serrata*, ×
 , *graveolens*,
Heliotropium peruvianum, × ‡
 , *curassavicum*, ‡
 , *indicum*, ‡
 , *parviflorum*, ‡

BORAGINEAE.

- Goldenia procumbens*, ‡
Echium violaceum, ‡
Lycopsis aensis,
Trichodesma indicum, ‡
 , *zeylanicum*, ‡
Anchusa italica,
Cynoglossum Falconerianum,

LABIATAE.

- Ocimum villosum*, ‡
 , *sanctum*,
 , *polystachyum*, ‡
 , *caryophyllum*, ‡
 , *Basilicon*, ‡
 , *gratissimum*, ‡
 , *cristatum*, ‡
 , *thyrsiflorum*, ‡
 , *micranthum*, × ‡
Geniosporum strobiliferum, ‡
Orthosiphon incurvus, × ‡
 , *stamineus*, × ‡
Saccostoma urticifolium, ‡

LABIATAE. — Continued

- Plectranthus c. rhifolius*, ‡
 , *punctatus*, × ‡
 , *rugosus*, ‡
 , *parviflorus*, × ‡
Coleus scutellarioides, × ‡
 , *aromaticus*, × ‡
Hyptis suaveolens, ‡
 , *radata*, × ‡
 , *corylifolia*, ‡
Lavandula Spica, ‡
Pogostemon plectranthoides, × ‡
Dysophylla verticillata, ‡
Colebrookia ternifolia,
 , *oppositifolia*, ×
Mentha verticillata,
 , *arvensis*, ×
 , *fruticosa*,
 , *crispa*,
 , *levigata*,
 , *piperita*,
 , *quadrifolia*,
 , *perillodes*,
 , *auricularia*,
 , *viridis*, ×
Meriandra benghalensis, ‡
Salvia coccinea, × ‡
 , *cana*, ‡
 , *splendens*, × ‡
Rosmarinus officinalis,
Monarda fistulosa, ×
Origanum Marjorana,
Thymus vulgaris,
 , *Nepeta*,
Hyssopus officinalis,
Melissa officinalis, ×
 , *rapens*, ×
Scutellaria discolor, ×
 , *carnea*, ×
Nepeta ciliaris,
Leonurus tartaricus, ‡
Anisomeles disticha, ‡
 , *ovata*, ‡
 , *malabarica*, ×
Stachys sericea, ‡
 , *lanata*, ‡
Betonica incana, ‡
Roylea elegans, ‡
Leucas stelligera, ‡
 , *polyccephala*, ‡

LABIATAE.—Continued.

- limifolia, ‡
 Gerardiana,
 strobilifera, X
 Leonotis nepetifolia,
 , zeylanica, ‡
 , cephalotes,
 , biflora,
 , esculenta, ‡
 , pilosa,
 Holmskioldia sanguinea, X
 Colquhounia coccinea, X
 Gomphostemma parviflorum,
 , melissifolium, X
 Ajuga mollissima,
 , bracteosa,
 Cynaria elongata, X ‡
 Labiata Pucha Pat, X

VERBENACEAE.

- Clerodendrum hastatum, X ‡
 , inerme, X
 , fragrans,
 , philomoides, X ‡
 , pyramidatum, ‡
 , nutans, X ‡
 , trichotomum, ‡
 , roseum, X
 , vestitum, X
 , infortunatum, ‡
 , Kempu, ‡
 , strictum, ‡
 , ardisifolium, X ‡
 , dentatum, ‡
 , serratum, X ‡
 , herbaceum, ‡
 , nerifolium, X ‡
 , odoratum, X ‡
 , aculeatum, X ‡
 , glanduliferum, X ‡
 , squamatum, X ‡
 Siphonanthus indicus, ‡
 Callicarpa incana, X ‡
 , purpurea, X ‡
 , cana, ‡
 , villosa, ‡
 , arborea, ‡
 , Reevesii, X ‡
 , lanceolata, X ‡

VERBENACEAE.—Continue

- Callicarpa acuminata, X ‡
 Premna procumbens, ‡
 , scandens, X ‡
 , esculenta, ‡
 , grandifolia, X ‡
 , laevis, X
 , serratifolia, ‡
 , integrifolia, X ‡
 , cordifolia, ‡
 , spinosa, X ‡
 , herbacea, ‡
 Hymenopyramis brachiata
 Vitex trifoliata, X ‡
 , Negundo, X ‡
 , alata, X ‡
 , incisa, X ‡
 , arborea, ‡
 , Leucoxylon, X ‡
 , saligna, X ‡
 , heterophylla, X ‡
 , Agnus castus,
 Congea pentandra, X ‡
 , azurea, X
 Synphorema involuteratum, X
 Gmelina asiatica, X ‡
 , villosa, ‡
 , arborea, X ‡
 , parvifolia, ‡
 Tectona grandis, X ‡
 , Hamiltoniana, X ‡
 Duranta Plumieri, X ‡
 , Ellisii, X ‡
 Streptium asperum, ‡
 Verbena Aubletia,
 , nodiflora, ‡
 , jamaicensis, ‡
 , bonariensis, ‡
 Stachytarpheta mutabilis, X
 , rubica, X ‡
 Lantana Sellowiana, X
 , trifoliata, X
 , Camara, X
 , nivea v. mutabilis, X
 , canescens,
 , aculeata, X ‡
 MYOPORINEAE.
 Myoporum debile, X ‡
 , congestum, X ‡

PEDALINEÆ

- Martynia diandra*, †
Sesamum indicum †
 „ *murale*, †

BIGONIACEÆ.

- Bignonia stipulata*, × †
 „ *adenophylla*, × †
 „ *undulata*,
 „ *æquinoctialis*, ×
 „ *suaveolens*, × †
 „ *crispa*, ×
 „ *quadrilocularis*,
 „ *amena*, × †
 „ *longifolia*,
 „ *phlomisoides*,
 „ *xylocarpa*, × †
 „ *indica*, × †
 „ *pubescens*, ×
 „ *suberosa*, × †
 „ *venusta*, ×
 „ *viridiflora*,
 „ *glutinosa*,
 „ *multijuga*, × †
 „ *echinata*,
 „ *califlora*,
 „ *cructera*,
 „ *gracilis*, ×
 „ *pinnatifolia*,
 „ *incarnata*,
 „ *venusta*,
 „ *Cherere*?
 „ *Chambolia*?
 „ *Chelonoides*, †
 „ *cauliflora*,
 „ *sp.*
 „ *sp.*

- Spathodea serrulata*, × †
 „ *Rheeder*, × †
 „ *uncinata*, ×

- Tecoma jasminoides*, ×
 „ *grandiflora*,
 „ *radicans*, ×
 „ *capensis*, ×

- Catalpa syringæfolia*,
Crescentia Cujete, × †
 „ *alata*,

GESNERIACEÆ

- Gloxinia speciosa*,
 „ *sp.* 3, indetermin.
Loxonia ?
Æschynanthus Roxburghii,

ACANTHACEÆ

- Chanbergia angulata*, ×
 „ *alata*, × †
 „ *diagrama*, × †
 „ *grandiflora*, × †
 „ *coccinea*, × †
 „ *Hawtayneana*, †
Nelsonia bimifolia, × †
Hygrophila obovata,
Hemiacalpis polysperma, †
Dipteracanthus ciliatus, × †
 „ *suffruticosus*, †
Petalidium bignoniaceum, × †
Ruellia suffruticosa, †
 „ *limbata*, × †
 „ *maculata*, ×
 „ *imbricata*,
 „ *longifolia*, †
 „ *negunda*, †
 „ *inflata*, †
 „ *luta*

- Strobilanthes cabia*, × †
 „ *auriculata*, × †
 „ *callosa*, × †
 „ *Sabina* a., ×
 „ *elegans*,
 „ *laevigata*, ×

- Goldfussia amissophylla*, ×
 „ *glomerata*,
 „ *isophylla*, ×
 „ *lanceifolia*, ×

- Asystasia coromandeliana*, × †

- Baileya polytricha*, †
 „ *Prionites*, × †
 „ *hirsuta*, × †
 „ *buxifolia*, †
 „ *cristata*, × †
 „ *dichotoma*, × †
 „ *cærulea*, × †
 „ *ciliata*, × †

- Lepidagathis hyalina*, × †

- Blepharis boerhaaviæfolia*, × †

- Acanthus madraspatensis*, †

ACANTHACEÆ—Continued.

- Accanthus trifoliola, ‡
 Crossandra infundibuliformis, × ‡
 Phlogacanthus thyrsoiflorus, × ‡
 , asperulus, ×
 , curviflorus,
 guttatus, ×
 Graptophyllum hortense, × ‡
 Adhatoda corynostachya, ‡
 , Vasica, ‡
 , Betonica, × ‡
 , ramosissima, × ‡
 Gendarussa ventricosa, × ‡
 , decussata, × ‡
 , Adhatoda, ‡
 , Neesiana, ×
 , quadrifaria,
 , vulgaris,
 , furcata, ×
 , bifaria, ×
 Etanthemum pulchellum, ‡
 , crenulatum, ‡
 , palatiferum, × ‡
 , azureum, ‡
 , strictum, × ‡
 Justicia Echolum, × ‡
 , micrantha, × ‡
 , repens, ‡
 , procumbens, ‡
 , pectinata,
 , calycotricha, ×
 , peruviana,
 , bilineata,
 , chinensis, ‡
 , guttata,
 , ventricosa,
 Rhinacanthus communis, × ‡
 Peristrophe lanceolaria, × ‡
 , speciosa, × ‡
 , tinctoria, × ‡
 Hypoestes purpurea, × ‡
 Rhaphidospora glabra, ‡
 Andrographis echinoides, ‡
 , paniculata, × ‡

LENTIBULARIÆ

- Utricularia stellaria, ‡
 , fasciculata, ‡
 , biflora, ‡

OROBANCHÆÆ.

- Orobanche pedunculata,
 , indica, ‡

SCROPHULARINÆ.

- Verbascum Thapsus, ‡
 Celsia coromandeliana, ‡
 Angelonia salicariafolia,
 Linaria purpurea, ‡
 , ramosissima, ‡
 Antirrhinum majus, ‡
 , rubrum,
 , triflorum,
 Maurandya antirrhinafolia, ‡
 , Barclayana, ‡
 Lophospermum erubescens, ×
 Browallia elegans, ‡
 Franciscea uniflora,
 Brunfelsia undulata, ×
 , montana, ‡
 , americana,
 Pentstemon angustifolium, ×
 , campanulatum, ×
 Russelia juncea, ×
 , floribunda, ×
 Stemodia polyantha, ‡
 Limnophila orbiculata, ‡
 , globosa, ‡
 , cruciata, ‡
 Mimulus scandens,
 Giatiola grandiflora, ‡
 , integrifolia, ‡
 , lucida, ‡
 , veronicæfolia, ‡
 , juicea, ‡
 , Monniera, ‡
 , reptans, ‡
 , serrata, ‡
 , parviflora, ‡
 , hyssopoides, ‡
 , racemosa, ‡
 Bonniaya reptans, ‡
 Limosella diandra, ‡
 Buddleia Neemda, ×
 , paniculata, ×
 , madagascariensis,
 , diversifolia, × ‡
 Veronica mcana,
 Scoparia dulcis, ‡

SCROPHULARINEÆ,—Continued.

GENIÆALÆ,—Continued.

Gerardia delphinifolia,

Bartsia coccinea,

Valeriana cristata, ‡

illica, ‡

SOLANÆ.

SPIGELIACEÆ.

Capsicum grossum, ‡

frutescens, ‡

baccatum, ‡

purpureum, × ‡

minimum, ‡

Solanum coriaceum × ‡

Balbisi,

pubescens, ‡

spirale, × ‡

tuberosum, ‡

Lycopersicon, ‡

rubrum, ‡

nigrum, ‡

Pseudocapsicum, ‡

obtusifolium,

Melongena, ‡

longum, ‡

Jacquinii, ‡

hirsutum, ‡

indicum, ‡

pentapetaloides, × ‡

sp.

sp.

Physalis flexuosa, ‡

peruviana, ‡

minima, ‡

Solanum grandiflorum, ×

viridiflorum,

Datura Stramonium, ‡

fastuosa, × ‡

Metelii, ‡

Brugmansia suaveolens, ×

quadri-valvis, ‡

Nicotiana angustifolia, ‡

Tabacum,

glaucum,

Hyoscyamus niger, ‡

Nicandra physaloides, ‡

Cestrum foetidissimum, ‡

GENIÆALÆ.

Platycodon decussatus, ‡

Exacum tetragonum,

Spigelia marilandica,

APOCYNÆ.

Echites frutescens, ‡

caerophyllata, × ‡

paniculata, × ‡

macrophylla, × ‡

cymosa,

trisantha,

acuminata, × ‡

Pentstemon suberectum, × ‡

Ichnocarpus frutescens, × ‡

fragrans, ×

Holarrhena mollissima, ‡

anthysantherica,

Beaumontia grandiflora, × ‡

Vallisneria spiralis, × ‡

Passiflora ligularis, × ‡

Nerium coccineum, × ‡

pisidium, ‡

odoratum, × ‡

Strophanthus caudatus, × ‡

dichotomus, ‡

Wrightia tinctoria, ‡

Alstonia scholaris, × ‡

venenata,

macrophylla, × ‡

nerifolia, ×

Vinca rosea, ×

major, ×

alba,

Tabernaemontana coronaria,

recurva, >

crispa, ×

dichotoma, ×

Camptaria oppositifolia,

Plumiera alba, × ‡

acuminata, ×

Allamanda cathartica, × ‡

Cassia Carandas, × ‡

ovata, ‡

chinensis, × ‡

villosa, × ‡

APOCYNÆA.—Continued.

- Carissa diffusa*, ‡
 indoma, ‡
Melodinus monogynus, × ‡
Strychnos Nux vomica, × ‡
 Potatorum, × ‡
 colubrina,
 spinosa,
 sp.
Cerbera Odollam, × ‡
 parviflora, ×
 Tanghin,
 fruticosa, ×
 Thevetia, × ‡
 Manghas, × ‡
Rauwolfia canescens, × ‡
Ochrosia borbonica,
Hunteria corymbosa, × ‡
Alyxia stellata, ×
Ophioxylon majus.
 serpentinum, × ‡
Willughbera edulis, ×
Alafia Thouarsii,
Apocynæa indeterminata, l.

ASCLEPIADEÆ.

- Ceropegia elegans*, ‡
 ovata, ‡
 lucida, × ‡
 Lushii, × ‡
 Stephanotis, × ‡
 Vicaryi, ‡
Stapelia variegata, ×
 Asterias, ×
 micusta,
 revoluta, ×
Caralluma fimbriata, × ‡
 crenulata, ×
 adscendens, ×
Bouccerosia umbellata, ×
Hya Jenkinsii,
 Potsii, ×
 carnosa,
 parasitica,
 viridiflora, × ‡
 mollis,
Tylophora asthmatica, ‡,
 tenuissima,
Marsdenia tenacissima, × ‡

ASCLEPIADEÆ.—Continued.

- Marsdenia Genevi*, ×
 tinctoria, ×
Pergularia odoratissima, ‡
 minor, ‡
Dischidia benghalensis,
 Rafflesiana,
Gymnema parvifolium, ‡
 acuminatum, ‡
 napalense, ‡
 pubigerum, ‡
Sarcolobus globosus, ‡
 carinatus, ‡
Asclepias tunicata, ‡
 paniculata, ‡
 tenacissima, ‡
 curassavica, ‡
 pseudogratiissima, ‡
Calotropis gigantea, ‡
 procera, ‡
Sarcostemma mauritianum,
Holostemma Rheederi,
Damia extensa, ‡
Toxocarpus laurifolius,
Streptocaulon Wallichii,
Hemidesmus indicus, ‡
Periploca græca,
Cryptostegia grandiflora, ‡
 madagascariensis,
Cryptolepis elegans, ‡
 reticulata, ‡
Myriopterion paniculatum, ‡

POTALIACEÆ.

- Fagraea obovata*, ×
Gardnera obovata,

OLEINÆ.

- Olea dioica*, ×
 myrtifolia, ×
 capensis, ×
 verrucosa,
 europæa, ×
 fragrans,
 glandulifera,
 attenuata,
 grata, ×
 acuminata,

OLEINE,—Continued.

CYCADACEÆ.

Olea chrysophylla,
Phillyrea robusta, × ‡
 , *paniculata*, × ‡
Chionanthus macrophyllus, ‡
 , *dichotomus*,
 , *zeylanicus*,
Ligustium nepalense,
 , *japonicum*, ×
Noronia emarginata, × ‡
Chondrospermum dentatum, ×
 , *smilacifolium*, × ‡
Fraxinus chinensis, × ‡
 , *floribunda*, ×

JASMINEÆ.

Jasminum Sambac, × ‡
 , *scandens*,
 , *pubescens*, ‡
 , *bracteatum*, × ‡
 , *bifarium*, ×
 , *latifolium*, × ‡
 , *aristatum*, ×
 , *arborescens*, ×
 , *angustifolium*,
 , *approximatum*,
 , *trimerum*,
 , *simplicifolium*, ×
 , *laetifolium*, ×
 , *ligustifolium*, ×
 , *attenuatum*,
 , *heterophyllum*,
 , *auriculatum*, ×
 , *lanceolatum*,
 , *fruticans*, ×
 , *chrysanthum*, ×
 , *grandiflorum*, ×
 , *dispermum*, ×
 , *caudatum*, ×
 , *syringæfolium*, ×
 , *claycinum*, ×
 , *gracile*,
Nyctanthus Arbor tristis, ×

Zamia spiralis,
 , *hercynica*,
 , *filiana*,
 , *pugioniformis*,
Cycas revoluta, × ‡
 , *spherica*, × ‡
 , *circularis*, ×

CONIFERÆ.

Pinus longifolia, × ‡
 , *Banksiana*,
Agathis laurifolia, ‡
Araucaria excelsa,
 , *Cunninghami*,
Thuja orientalis, × ‡
 , *pendula*, ×
Cupressus stricta,
 , *austriaca*,
 , *sempervirens*,
 , *fastigiata*, ×
 , *sp.*
 , *sp.*
Juniperus communis
 , *horizontalis*, ×
 , *chinensis*, ×
 , *virginiana*,
Daquidium elatum,
Podocarpus chinensis,
 , *macrophyllus*, ×
 , *elongatus*, ×
 , *cafrinus*,
Taxus nuceifera,
Salisburia adiantifolia.

PLANTÆ INCERTÆ SEDIS.

Perplexis rigida, ‡
Sarcostigma Roxburghii, ‡
 , *limonifolium*, ‡
 , *sp.*

OMITTED FROM NAIADES.

GNETACEÆ.

Gnetum Gnetum,
 , *scandens*,

Spathium undulatum,
 , *monostachyum*.

Monthly Proceedings of the Society.

(Wednesday, the 13th December, 1843.)

The Honorable Sir J. P. Grant, President, in the Chair.

Messrs. G. R. Gordon, Charles Chapman and T. B. Swinhoe, who were proposed at the last Meeting, were duly elected Members of the Society.

George Jephson, Esq. of Calcutta, was proposed as a Member of the Society by Mr. Wm. Storm, seconded by Mr. C. S. Stowell.

Presentations to the Library.

1. Lectures on the condition, resources and prospects of British India, by George Thompson. *Presented by Mr. Landers.*

2. Memoranda upon the state of Indian Bazar Weights and Measures. *Presented by the Author, Mr. H. G. Palmer.*

3. The India Journal of Medical and Physical Science, No. XI, of vol. 1. *Presented by the Proprietor.*

4. The Calcutta Literary Gleaner, No. X, of vol. 2. *Presented by the Proprietor.*

5. Liebig's Chemistry of Agriculture and Physiology. (second Edition,) and Falkner's Practical Treatise on the nature and value of Manures. *Purchased by the Society.*

GARDEN.

1. An assortment of English Fruit Trees, consisting of apples, pears, plums, nectarines, peaches, raspberries, currants, gooseberries and vines. *Presented by Capt. E. P. Nisbet, Commander of the Agincourt.*

Capt. Nisbet mentions, that having heard from Dr. Falconer, that the fruit trees he brought out two years ago were succeeding admirably in the Hills, he should prefer these being sent were likely to thrive the best. Capt. Nisbet adds, that the trees are at present in the hands of Dr. Griffith, who has kindly taken charge of them.

The best thanks of the Society were given to Capt. Nisbet, for his handsome contribution. At the request of the meeting, Dr. Griffith agreed to take charge of these plants, with the view of carrying Capt. Nisbet's suggestion into effect.

2. Two boxes of English fruit trees. *Purchased by the Society.* (Further particulars regarding this consignment will be found in the report of the Garden Committee.)

3. A large supply of tulip bulbs, consisting of the Bizard, Rose Byblomen, early, double, striped, and other varieties. *Purchased by the Society and received by the Overland Mail.*

It was suggested that a portion of this assortment be presented to Dr. Griffith for trial at the Botanic Garden, and the remainder distributed over Bengal and Upper India. Dr. Griffith kindly consented to carry out this suggestion in all its parts.

MUSEUM.

1. Samples of Cotton grown at Sydney from American and other foreign varieties of seeds. *Presented by Dr. J. F. Thompson, Deputy Inspector General of Hospitals, at Sydney.*

2. Further samples of Cotton from Dr. Thompson. *Presented by the Government of India.*

3. A supply of Burmah Cotton Seed. *Presented by Joseph Ayubey, Esq.*

4. Sample of Cassia from Assam. *Presented by Dr. Griffith, on behalf of Major Jenkins.*

The Secretary stated that in his note forwarded on this cassia, Dr. Griffith mentions, it would be interesting to Major Jenkins if the Society could obtain an opinion regarding its value. He had accordingly taken steps to meet this request, and had now the pleasure to submit two reports with which he had been favored by Messrs. Bennie and Terry. He also begged to read a communication on the same subject from Mr. Landers, who has had practical experience with the article.

It was directed that a copy of the reports be furnished for Major Jenkins' information, and that all the papers be transferred to the Committee of Papers.

5. Sample of soil from the little Constantia Vineyard at the Cape of Good Hope, one of the Estates producing the famous Constantia Wine. *Presented by C. Cardew, Esq.*

6. A small supply of seed of the *Dalbergia lanceolaria*. *Presented by Mr. John C. Ondaatje, Superintendent of the Royal Botanic Garden at Peradenia, Ceylon.*

Mr. Ondaatje states that this is a valuable timber tree, and much used in Ceylon, where it is commonly called "Nandu Wood." The seeds were transferred to the Society's garden.

Provision for Garden and Flower Seeds for 1844.

The Secretary informed the meeting, that the time had now arrived for making arrangements for a supply of garden and flower seeds for

the next season; it was therefore necessary to determine what amount should be voted for that purpose. He begged to mention, that since the last meeting of the Society a consignment of seed to the value of 450 Rs., had been received from America. The consignment having reached so late, the Kitchen Garden Committee, whose remarks on the subject he begged to submit,—had agreed to reserve the seeds for transmission to distant Members in the early part of next year. From an estimate drawn up with reference to the expenditure on this head during the present year, the sum of 3000 Rs. including the 450 Rs. above alluded to, would appear to be sufficient to meet all demands for next season. In advertence to the following extract of a letter lately received from Major Napleton, Secretary of the Bangalore Branch Agricultural Society, he would beg to submit, for consideration, whether it would not be desirable to withdraw the amount hitherto voted for flower seeds from the Cape, which have generally proved to be of an inferior description, and appropriate it for a trial assortment from the English seedsmen recommended by Major Napleton —

Extract.—"Our English Seedsmen, Vetch and Sons, Exeter, Devonshire, have sent us a magnificent batch of Flower and Vegetable seeds, per overland route,—their charges are most reasonable, and their seeds so fresh, that they came up freely the fourth day after sowing,—and I strongly recommend these well-known Seedsmen and Florists to the notice of the Parent Society."

It was proposed by Mr. Staunton, and resolved, that the sum of three thousand Rupees be voted for the purchase of seeds for next season, and that it be referred to the Fruit and Kitchen Garden Committee to make the necessary arrangements, and to determine in regard to the suggestion of a small supply of seeds from England.

Horticultural Exhibition and Anniversary Dinner.

The Secretary next called attention to the amount to be voted for prizes to Native gardeners during the next year; as also to the period when the first exhibition and anniversary dinner should be held. From enquiries made, he had ascertained that, in consequence of the season being an early one, the vegetables would be likely to attain perfection about the middle of January.

Moved by Dr. Griffith, seconded by Mr. William Storm, and resolved, that four hundred Rupees be voted for prizes for the exhibitions of 1844.

Moved by Sir Lawrence Peel, seconded by the Secretary, and resolved, that Saturday, the 13th of January, be the day for the Exhibition and dinner.

The Metcalfe Hall.

Mr. Robison informed the meeting that as the Metcalfe Hall was now almost ready for occupation, it was necessary that steps should be taken towards the fitting up, &c. of that portion of the building to be appropriated for the accommodation of the Society, he accordingly begged to move,—

• “That a Committee be appointed to inspect the Metcalfe Hall, now approaching completion, for the double purpose of communicating with the Metcalfe Hall Committee, and reporting to the next meeting of the Society, and also for the purpose of examining the portion of the building which belongs to the Society, and reporting what furniture, &c. may be required for it.”

The motion was seconded by Mr. Griffith and agreed to.

It was further moved by Mr. Robison, and seconded by Mr. Griffith, and resolved,

That the Finance Committee be that Committee, and that the name of Mr. C. K. Robison be added to the Committee.

*Society's Nursery Garden, —English Fruit Trees, —Cacao Plants; —
Sugar cane, &c.*

The paper next submitted was a report from the Garden Committee of a meeting held on the 8th instant. The Committee propose that the Fruit Trees per *Agnicourt*, which arrived in excellent condition, should be distributed among the members of the Society who are more particularly interested in this sort of cultivation, and that a selection should be sent to the Branch Garden at Bhauglepore. That of the Cacao plants, which are in excellent condition, two should be presented to the H. C. Botanic Garden, and the remainder planted out in an eligible place with sufficient shade: and that thanks be given to Mr. Ross, Head Gardener of the H. C. Botanic Gardens, for the successful treatment these plants have received at his hands. The Committee suggest, as the means of securing the most profit to the Society, that in consequence of the very limited demand for cane, (two thousand only have been disposed of,) and the limited prices offered for such as were to be disposed of, (about sixteen thousand,) that with the exception of the best *real* Otahcite cane to be kept for stock, the whole of the canes be converted by the overseer into *gour*. The Committee further add some

suggestions in regard to the Kitchen Garden Department, and for extending the cultivation of Cuba Tobacco, and reducing that of the Manila Hemp. The Committee close their report by stating, that the garden is in a satisfactory condition. The report of the Committee, in all its parts, was confirmed.

Report on Samples of Wheat from Hoosungabad.

A report on the samples of Wheat, and other grains, the produce of Hoosungabad, which were transmitted by Colonel Ouseley, and presented at the last meeting, was next read, together with a separate report drawn up by Mr. W. Haworth. Mr. Haworth is of opinion, that of all the varieties, the Sohalya and Pissee wheats are the finest. The Sohalya he considers a suitable wheat for most markets, and is more like English wheat than any of the other samples, except the Pissee, which, if it could be sent to England in good condition, would be as valuable as the best kinds of English wheat—it weighs moreover 63lbs. to the bushel.

The best thanks of the Society were directed to be given to Mr. Haworth, for his kindness in drawing up this report. It was also directed that a copy of the report should be furnished to Colonel Ouseley for his information, and transferred to the Committee of Papers.

Bhaugleporc Branch Agri-Horticultural Society.

The next communication submitted to the meeting was from Major Napleton, Secretary of the Bhaugleporc Branch Society, transmitting, for the purpose of being laid before the Parent Society, the proceedings of a meeting held at Bhaugleporc on the 15th ultimo. Major Napleton also encloses an account of the show of Flowers, Fruits and Vegetables which took place on the evening of the same day, and gives the result of trials on the Flax, Cotton, Tobacco, Barley, &c. seed received from the Parent Society.

Major Napleton adds, “my mode of sowing English seed is as follows—Sow in moderately moist and well prepared ground, cover in the seed slightly with a *coorpee* (weeding knife) and then sprinkle a basket of old ashes over each bed. Irrigate 48 hours after sowing, and again a week afterwards. Under this treatment our overland seeds are bursting forth in great style.”

The best acknowledgments of the Society were offered to Major Napleton for his interesting and encouraging report, which, together with his letter, were made over to the Committee of Papers.

Prospectus of a Work on the Commercial Products of India.

The Secretary stated, that he had received by the last mail a letter from Dr. Royle, enclosing some copies of a prospectus of a work on which he is now engaged, on the commercial products of India, and which he hopes will be useful to practical men desiring to become acquainted with the products of India, and the names by which they may be obtained. Dr. Royle states, that these prospectuses are issued for the purpose of collecting information, and all kinds will be gratefully acknowledged.

The work, Dr. Royle adds, will be in parts, the first on Timber trees and Cordage plants.

The Committee of Papers were requested to insert the prospectus in an early number of the Journal, with a view to assist in meeting Dr. Royle's request for information.

Culture of Foreign Cotton at Jessore.

The Secretary informed the meeting that he had lost no time in distributing the greater portion of the first supply of acclimated New Orleans and Bourbon Cotton seed, the produce of the Government Cotton farm at Combatore, which had been placed at the disposal of the Society, through the kindness of Dr. Wight, in September last. He had now the pleasure to submit, in the following extract of a letter, dated 5th December, with which he had been favored by Mr. A. T. Smith, a member of the Society, residing at Jessore, the first intelligence the Society has received, regarding the result of trials with this seed —

"All the acclimated New Orleans and Bourbon Cotton seed I received from the Society in the early part of October, was immediately sown, and *not a seed failed*, the plants are now from 6 to 8 inches high, and look very healthy."

Mr. Smith promises to communicate further progress, and to send samples of the Cotton in due course.

Communications on various subjects.

The following letters and papers were also submitted :—

1.—From T. R. Davidson, Esq., Secretary to Government of India, Home Department, dated 2d December, enclosing copy of a letter from the Secretary to Government N. W. Provinces, with a report from Mr. Blount, Government Cotton planter, regarding the American Cotton cultivation at Goruckpore.

2.—From Dr. J. V. Thompson, Deputy Inspector-General of Hospitals at Sydney, forwarding samples of Cotton of various kinds, the produce of his estate at Sydney.

3.—From T. R. Davidson Esq., Secretary to Government of India, transmitting copy of a letter from Dr. J. V. Thompson, to the address of the Governor General, together with the samples of Cotton therein referred to.

4.—From Capt. G. E. Hollings, Lucknow, dated 26th November, submitting replies from Lucknow and Fyzabad, to queries regarding manures.

5.—From A. H. Landers, Esq., presenting a memorandum on the vegetable and other products of the Shan country, with some accounts of its trade. Mr. Landers mentions that this paper has been compiled from notes which he made during his travels in that country in 1842-43.

6.—From Dr. Royle, giving an account of the successful culture of the Himalyan Onion in England.

The above communications were transferred to the Committee of Papers.

7.—From George Eveleigh, Esq. enclosing extract of a letter to his address from Mr. Borchards, a member of the Agricultural Society of the Cape of Good Hope, and another to the address of the Society from Mr. Van Breda, Secretary of the Cape Society

Mr. Van Breda acknowledges receipt of the Journals of the Agricultural Society of India, and expresses the thanks of the Cape Society for the same, and their readiness to continue correspondence.

For all the foregoing communications and presentations, the thanks of the Society were accorded.

Report of the Agricultural and Horticultural Society of India, for the year 1843.

In continuation of former Reports, the Society has the pleasure to submit the following outline of its proceedings during 1843 —

Introduction.

The first question of importance relates to the internal economy of the Society. Since the close of 1842, sixty-eight new names have been added to the list, while the loss from deaths and resignations, has been also considerable. There have been fourteen deaths, sixty six resignations, and two, (Mr. T. J. Bell, and Baboo Keenut Sing,) truck off for non-payment of subscriptions, in all eighty-two. It may be added, that many resignations have taken place in consequence of departure from the country. The distribution of the Members as they now stand, may be referred to the following classes :—

	In former years		In 1843		In 1844		In 1845		In 1846		In 1847		Gross Total		Total Number at the close of 1847, after deducting lapses.	
Honorary Members,	6	1	0	1	0	2	0	1	1	11			9			
Free Member,	0	0	0	0	0	0	1	0	1	0			1			
Civilians in the Service of Government,	46	41	11	27	27	19	21	14	20	159						
Merchants and Traders,	31	36	28	15	19	13	18	16	17	125						
Indigo and other Tropical Agriculturists,	25	21	43	23	27	21	7	15	18	96						
Military Officers,	34	17	18	15	18	21	4	16	14	98						
Medical Ditto,	14	16	10	7	7	10	9	1	7	56						
Asiatics,	13	9	7	1	7	8	6	5	5	42						
Clergy,	5	2	2	1	0	1	1	1	1	13						
Law Officers,	14	5	1	5	3	0	6	2	3	24						
Miscellaneous,	0	0	3	0	2	0	2	0	7	7						
	188	148	123	95	110	95	75	68	90	601						

If from this return of six hundred and one members, thirty-nine who have compounded for their subscriptions be deducted, with nine honorary members, one hundred and nine abseeptees in Europe, and one free member, there will remain four hundred and forty-three as the actual number of *paying* members now on the strength of the Society.

The following are the members who have been taken away from the Society by death during the past year:—The Honorable J. Stewart Mackenzie, late Governor of Ceylon, (an honorary member;) Colonel

Charles Poole, Commanding at Chunar; Mr. T. H.

Gardiner, Merchant, of Calcutta, Dr. Voigt, Surgeon of His Danish Majesty's settlement at Serampore; Mr. James Colquhoun, Merchant, of Calcutta; Rajah Khan Bahadour of Gya. Mr.

Neerology.

Harris, Indigo Planter; Major DeBude, Secretary to the Military Board, Calcutta; Mr. James Curtis, Indigo planter; Mr. W. H. Stacy, Merchant, Calcutta; Mr. Andrew Laidlay, Indigo planter; Mr. R. Vaughan, of the Supreme Court; Mr. R. S. Maling, Superintendent of Salt works at Baguadee; and Mr. Wm. Sinclair, Indigo planter at Malda.

Among other topics which have engaged the attention of the Society during the year, that relative to the admission of Indian Wheat question.

Indian wheats into British ports, at a more favourable rate of duty than now obtains, may be considered as of the first importance, and is therefore primarily alluded to, although it did not come under discussion earlier than at the meeting in May. As the merits of the question are fully dwelt on in the proceedings for that month, it is unnecessary in this place to do more than mention what steps have been taken towards the carrying out, in some measure, of the intentions of the Society as incorporated in the following motion:—
 “That a Committee be appointed to enquire into the capabilities and advantages of giving encouragement to the export of wheat from this country; and to report upon the expediency of our expressing our gratitude, as an Indian Public Society, to the Court of Directors, for pressing on the Home Government the important measure of the admission of Indian wheat into British ports, and at the same time expressing our earnest support to the measure, as one calculated to benefit and advance the interests of India.”

The Committee thus formed, submitted at the following meeting in June, a Report of the proceedings of their preliminary meeting, in which they recommend, as a first step, the circulation of queries over different parts of the country, with a view to obtain as much information as possible on all points connected with the subject of their enquiry. This report was adopted, and no time was lost in giving effect to the suggestion. Here for a time the labours of the Committee ceased. At the October meeting, a memorandum was submitted, by a member of the Committee, urging that the matter be brought to a close as speedily as possible;—whereupon it was resolved, to refer the question again to the Committee. At the next meeting in November, the Committee informed the Society, that the information on hand was not sufficient to admit of their drawing up a full report, but suggested that a second application be made to those who had not complied with the requests contained in the first circular. This was agreed to and carried into effect. Since then, several communications have been received, and the Committee hope to submit the result of their enquiries in the early part of next year.

The propriety of making some alteration in the mode, formerly adopted for encouraging improvement in the growth of vegetables and fruits, was brought under the consideration of the Society in the early part of the year. The subject underwent discussion at the meeting in February, on the submission of a list of money prizes and medals which were awarded at the annual exhibition in January, and it resulted in the formation of a Committee, under the designation of the "Fruit and Kitchen Garden Committee." This Committee gave in their report at the April meeting, in which, among other suggestions, they recommend that in lieu of an annual show, quarterly exhibitions be held in future. This suggestion was deemed a very desirable one, but it was not considered necessary to carry it fully into effect till next year. In the meantime it was agreed, that another exhibition should be held in October. This took place accordingly, and was considered a satisfactory commencement of the change from an annual to quarterly exhibitions.

In the department of rewards, the Society has to report, in addition to the above-mentioned, the adjudication of the following medals at the annual exhibition of cattle, held on the 1st of February —

To Dr. Hufnagle, for the best imported cow of any denomination the silver medal.

To Dr. Hufnagle, for the best cross, the produce of an imported bull or cow with native stock, the gold medal.

To Dr. Hufnagle, for the best bull calf of any denomination, calved in 1842, the gold medal.

To Mr. J. Wallace, for the best cow calf of any denomination, calved in 1842, the silver medal.

At the March Meeting, the President called the attention of the Society to the limited result which had attended the offer of prizes for improving the breed of cattle in India, notwithstanding that a period of five years had elapsed since the first exhibition had taken place, during which time a sum equal to 4,000 Rupees had been expended for money prizes, and for gold and silver medals. The subject was referred to the Committee, who, at the following meeting in April, submitted their report to the effect, "that the attempt to improve cattle and sheep by money premiums and medals, has not held out sufficient encouragement, in the number of cattle brought forward at the shows, to induce a continuance of the annual exhibitions; and they consequently deem it advisable to recommend that such premiums for public competition be withdrawn.

Withdrawal of Prizes
for Cattle after 1844.

after the expiration of another year, so which period the engagements of the Society extend." This report was confirmed, and the exhibitions will accordingly cease after February 1844. ,

In the last Annual Report, allusion was made to the formation of an
Formation of Agricultural Societies. Agricultural Association at Ceylon. The Society has the further gratification of announcing the establishment of three similar Institutions during the present year, viz. at Agra, at Bhauglepore, and at Moulmein, the two latter being branches of this Society.

The Agra Society was formed in the middle of the year, and a report
At Agra of its proceedings is promised so soon as the first half yearly meeting has taken place.

The Moulmein Society came into existence at the close of the year,
At Moulmein and consequently is not sufficiently matured to admit of any report of progress.

From the Society at Bhauglepore, several gratifying communications
At Bhauglepore. have been received, and published in the Journal of the Parent Society. Although established only eight months, this promising Society already numbers 111 members. Several exhibitions to promote the improved culture of vegetables, fruits, &c. have been held, and a large piece of ground has been converted into an useful and ornamental garden. It is to the indefatigable exertions of its Secretary, Major Napleton, that this Branch Society is indebted for its rapid rise and present prosperity. The usual amount of fifty Rupees and two silver medals, voted to all its branches, has been awarded by the Parent Society to this Institution, besides a large supply of seeds of all sorts, and an assortment of English fruit trees

In addition to the above, the Society has received several communi-
Public Garden at Lucknow cations from Captain G. E. Hollings, regarding the Garden of the Branch Society at Lucknow. This garden is in a very flourishing condition, owing to the great care and attention which Captain Hollings has bestowed on it.

The Society has received intimation during the year of the dissolution
Dissolution of the Allahabad Agri-Horticultural Society. of the Allahabad Agricultural Society. This has been brought about in consequence of the decrease in the number of its members, and the removal of the Sudder Court and Board to Agra. The Society have transferred their stock, &c. to the Magistrate and Collector of Allahabad, to be applied, as far as practicable, to carry out the original object of the Society.

The measures which have been adopted to improve the growth and Culture of Flax, Hemp, and Coffee at Chittagong, manufacture of hemp and flax at Chittagong, and to introduce the cultivation of coffee, have been brought to the notice of the Society during the year, by Mr. Sconce, the Collector of the province. With a view to establish the culture of the latter staple, a Joint Stock Company has been formed, at the recommendation of Mr. Sconce. This gentleman has also forwarded to the Society, samples of flax and hemp, the produce of foreign and country seed, and the quality was considered so good, as to induce the Society, at the suggestion of its Committee to appropriate the sum of two hundred Rupees for prizes to be awarded next year, for the best cultivated five beeghas of hemp and flax, and for the best five maunds of both articles in a manufactured state. The Society has further placed at the disposal of Mr. Sconce, a set of the necessary improved implements for dressing flax and hemp. The Report of the Committee and all other particulars will be found in the second number of the Journal. The Society hope to have a further and fuller account next year, of the result of these experiments.

It was mentioned at the close of the last report, that a Subscription had been commenced for the purpose of procuring a marble bust of the late Rev. Dr. William Carey, to be placed in the new apartments at the Metcalfe Hall. The Society has now the pleasure to add, that a total sum of £155 has been raised for this object. Professor Royle has been solicited to make the necessary arrangements for carrying the wishes of the Society into effect, and a bill for £120 has been remitted to him for that purpose.

In the Report for 1840, full particulars will be found regarding the preliminary arrangements for the erection of the Metcalfe Hall. The Metcalfe Hall, in the lower story of which building the business of the Society is to be hereafter conducted. The Society has now to mention, that the building is rapidly approaching completion, and will, it is hoped, be fit for occupancy in the early part of next year. As the Society possesses so great an interest in this handsome edifice, towards which it has subscribed a sum exceeding sixteen thousand Rupees, it is considered that the following description of the building will not only serve as a record, but be likewise acceptable to the Members of the Society:—

“ It is raised on a solid but ornamental basement of ten feet in height, and extends a hundred and fifty feet in length, and a hundred in breadth. The order of Architecture is from the Portico of the Temple, or Tower of the Winds, at Athens. The

Bust to the Memory
of the Founder of the
Society.

Description of the Build-
ing.

completion of roof is taken from the Cloragic Monument of Thrasyllus, also at Athens. The front of the building, as seen from the Strand, presents to view a broad flight of steps, sixteen in number, and sixty-five feet long, leading to the portico or colonnade. On the opposite side there is a covered colonnaded entrance, with a similar flight of steps, which lead up to the lobby and internal stair case. The columns and colonnade nearly surround the whole building; the former, which are thirty in number, and thirty-six feet high, rise from the basement; and the entablature being carried all round, gives the building externally, the appearance of a Grecian Temple of one lofty story. Internally, however, there are two stories. The first floor is to be occupied by the Agricultural and Horticultural Society, and consists of a hall, 63 feet by 30; a seed and specimen room, 36 feet by 24; a museum or room for models of Agricultural and Horticultural implements, 36 feet by 24; a lobby also 36 by 24; a Secretary's room, 24 feet square; and a corridore, or passage, leading to the main hall, 36 by 12 feet. All these rooms are 22 feet high in the roof. The upper story is to be occupied by the Calcutta Public Library, and communicates with the lower one by a handsome teak wood stair, 7 feet in width. In the interior of the building, a conspicuous place will be allotted for the reception of a bust of Sir Charles Metcalfe."

In the last Annual Report allusion was made to the withdrawal of Government by Government, of free postage on all communications addressed to or by the Society, and fears were entertained that the deprivation of this privilege, after its enjoyment for so many years, would affect, in a measure, the usefulness of the Institution. So general was this opinion, that at the particular request of the Society, the President addressed, in the early part of the year, His Honor the Vice President in Council, a second time on the subject, pointing out "that an expence of certainly not less than Rupees 1,000 per annum is for all future years deducted from the funds to be devoted to its legitimate object, the improvement of the produce of the soil, from which, by a direct taxation, the whole of the revenues of the Government are derived, and that the transmission of agricultural seeds to the interior of the country will be greatly curtailed, if not, as is most probable, nearly put an end to."

The Society much regrets to add, that this appeal was equally as unsuccessful as the former; for the Secretary to the Government of India, in his reply states, that "His Honor in Council regrets, that consistently with the just demands of the state, he cannot alter the orders already passed on the subject." The experience of the past twelve months

Unsuccessful result of a second appeal on the subject of the withdrawal of Free Postage

has proved, that the apprehensions referred to in the last Report, are not groundless, for the Society has not had it in its power to despatch more than half the quantity of useful seeds which were distributed over the country during 1842.

But while it is obliged to allude to the unfortunate result of its application in the above matter, the Society would also acknowledge, with thanks, the proposed compliance, in part, by the Hon'ble the Court of Directors, of the request which it preferred in 1841, for permission to receive its supply of seeds from England, free of charge, by the Mediterranean and Red Sea Steamers. The Court intimate, that although the bulk of supplies of seeds required by the Society is far too great to admit of their being forwarded by the Steamers via Bombay, and across the Continent of India to Calcutta, yet "they will be disposed to meet the wishes of the Society to a certain extent, when the direct communication between Suez and Calcutta, by steam, is effected, and shall take opportunities of sending occasional supplies of such seeds as are deemed of importance, by the most speedy conveyance."

Although, from the circumstance previously alluded to, so much has not been effected during the year as could be wished, yet the Society has not been idle in the distribution of agricultural seeds, whenever favorable opportunities have been presented.

Through the kindness of its members, supplies of cotton seed have been placed at the disposal of the Society, and by this has been obviated the necessity of any call on its funds on this account. Dr. Hufnagle, an honorary member, to whom the Society is much indebted for former gifts of a similar nature, has again most handsomely presented a quantity of Tennessee Cotton seed. Dr. Wight, Superintendent of the Government Cotton Plantations at Coimbatore, has likewise transmitted a fine supply of acclimated New Orleans and Bourbon seed, the greater portion of which has been distributed. At the considerate recommendation of this gentleman, the Government of Madras has also been pleased to forward to the Society several casks of imported Upland Georgia and Sea Island seed. Mr. Joseph Agabeg, of Calcutta, has likewise favored the Society with a supply of cotton seed from Burmah.

In consequence of the many demands for Carolina paddy, the Society has ordered, through the friendly agency of Messrs. Haworth and Hardman of this city, a consignment of seed, which is likely to reach in March or April of next year.

Small supplies of seed of foreign hemp, flax and wheat have likewise been procured and distributed. The accounts regarding the two former are not favourable; of the latter no tidings have as yet been received, but the Society hope to obtain some information of the result of trials in due course.

Attempts have also been made to procure pods of the superior description of Cacao from the West Indies, and this is likely to be attained through the kindness of Professor Royle. The Society is likewise indebted to the East India and China Association, and its Secretary, Mr Stikeman, for their ready compliance with its requests in this matter; also to Captain Marquard, for having generously placed at its disposal several plants, the produce of his garden at Chittagong. Here it may not be out of place to mention, that a few plants were received some time ago by the Society from the Straits, and have now become very healthy specimens from the successful treatment experienced at the hands of Mr. Ross, Head Gardener of the H. C. Botanic Garden.

In the Horticultural Department, seeds have been imported from America and the Cape of Good Hope. In consequence of the very limited variety of flower seeds supplied by the seedsmen at the latter place, it has been determined to appropriate the sum of £10 for a supply of flower seeds from England, to be forwarded by the overland conveyance. By this arrangement it is hoped the consignment of next season will be more perfect, and give greater satisfaction to the members.

The good condition in which a supply of fruit trees, ordered last year from England, had reached, induced the Society to obtain a further assortment this year. A portion of this supply, shipped on the *Agincourt*, has come to hand in even better condition than the last, *with the loss of only one tree*. About half of this stock has been transferred to the garden of the Bhaugleapore Branch Society, and the remainder distributed to members. To the liberality of Captain Nisbet, commander of the *Agincourt*, the Society is indebted for a further fine supply of fruit trees, which, at his suggestion, has been despatched to the Hills.

The distribution of sugar cane from the Society's Nursery Garden, has not been so extended as during 1840-41, but greater than that of last year. The total produce during the present year may be estimated at twenty thousand canes, consisting of the Otahete, Singapore, Bourbon and

Flax and Hemp Seed,
Europe Wheat and
Barley.

Cacao Plants.

Horticultural Dept
Garden and Flower
Seeds.

English Fruit Trees.

Nursery Garden, Sugar
Cane culture, and dis-
tribution.

China varieties. Of this number, about twelve thousand have been distributed, the remainder is to be converted into *cori.*

Large supplies of tobacco seed of sorts, of guinea grass seed and "pois noir" have been gathered during the year, and distributed. In consequence of the continued demand, a larger cultivation of the guinea grass has been made.

Many cuttings of the *Morus multicaulis*, with plants of the *Pandanus vacca*,* have been disposed of. For the latter plant, the Society is indebted to Mr. T. F. Henley, a member, who presented a quantity of seed in the early part of the year. This gentleman has promised to procure a further supply from the Mauritius to admit of its distribution by the Society during next year.

In addition to the above and several other cultures, a portion of ground has been appropriated for the growth of European vegetables, with a view to raise seed for distribution, and to obviate the necessity of indenting, in future, for such large annual supplies from abroad.

The change in the Literary Department from an annual volume of Transactions to a Monthly Journal, was noticed in the last Report. It now only remains to add, that this has been carried out, and ten numbers have been published during the year.

The Society would take this opportunity to acknowledge its obligations to its correspondents for the several communications which have been presented during the year and published in the Journal. To Mr. Wray, for his "Sugar Planters' Companion," to Mr. Finnie, for his paper regarding the failure of the cotton crops at the Government Experimental Farms in the Doab; to Dr. Robert Wight, for his suggestions for the better transmission of plants from one part of India to another, and for his various communications regarding the progress of the Government Cotton Farm at Combatore; to the Honorable Mr. Anstruther, for communicating the result of experiments made at Ceylon with Carolina paddy; to Mr. Tonnochy, for particulars regarding an oil-giving-plant in the district of Bolundshahur; to Mr. Henley, for his notes on the *Pandanus vacca* or Screw Pine; to the Medical Board for some correspondence from

* The leaves of this tree make a strong and excellent material for bags, and is much employed by the Mauritius Sugar Planters. For particulars, see Mr. Henley's paper, in the 2d Volume of the Journal.

Dr. W. Montgomerie at Singapore, relative to a variety of caoutchouc termed Gutta Percha, to Captain Hollings, for his reports regarding the garden of the Lucknow Branch Agricultural Society, and for replies to queries concerning manures from Lucknow and Fyzabad; to Mr. Hamilton Bell, for some further particulars regarding the Berareea cotton, to Dr. A. Grant, (H. M. 55th Regiment,) Mr. Tradescant Lay, and the Rev. C. Gutzlaff, for their replies to queries concerning manures employed by Chinese Agriculturists, to Mr. Sconce, for his communications respecting hemp, flax and coffee culture at Chittagong; to Dr. Alexander Gibson, for his practical remarks on the culture and preparation of senna in the Bombay Presidency, and for his report of trials made of the power of Bramah's Hydrostatic Press, as applied to the extraction of oil from various products; to Mr. C. E. Ravenshaw, for communicating the result of experiments for the introduction of American cotton into the province of Behar; to Lieut. J. C. Brooke, for some particulars regarding the salep plant procured at Kotra; to Mr. Edward O'Riley, for his remarks on coffee and sugar culture at Amherst, to the Government of Bengal, for correspondence connected with the unsuccessful culture of American cotton at the Government Farm at Goruckpore; and to Mr. A. H. Landers, for his paper regarding the vegetable products, &c. of the Shan country.

The Society cannot quit this subject without reiterating the call made in the last Annual Report, for contributions from the many Indigo Planters and Agriculturists, resident in various parts of the country. It has been well observed, in one of the earlier numbers, that the quantity as well as the quality of the original matter which the Journal must contain, is mainly dependent upon the communications of the Mofussil members of the institution. The Society indulge the hope, that more will follow the example of the correspondents whose names are alluded to above, and that they will not only come forward with the result of their own experience, but induce others to assist in so good a cause. It would seem that many are loath to address the Society under the belief, either that the subject has been previously brought to notice, or that it is not of sufficient importance to warrant its communication. Such considerations should not be allowed to prevail. It is possible that information, even of the most trifling nature, may be turned to account; and admitting that the subject may have been already treated on, yet it may not have received that degree of attention which its

Call for further assistance.

merits deserve in that case, its renewal or re-ignition, may have the effect of awakening that interest, which a former communication failed to excite.

In closing this brief Summary of the business of the year, the Society
Conclusion. ty hopes for the continued co-operation of all who
are interested in its objects, and trusts, the next Report may shew, that its request for greater assistance in the literary department has not been made in vain.

Statement of Receipts and Disbursements of the Agricultural and Horticultural Society of India, from 1st January to the 31st December, 1843.

RECEIPTS

From Members, subscriptions collected during the year, ...	14,115	1	6
„ Government annual donation, ...	1,045	0	0
„ Do. monthly allowance for 12 months at 135 13 6 per month, 1,630 2 0			
	<u>2,675</u>	2	0
Proceeds of a portion of surplus Cape vegetable seeds sold during the year, ...	227	0	0
„ Ditto, of sugar cane, delivered from the Nursery Garden, ...	306	14	6
„ Ditto, of copies of the Transactions of the Society, ...	56	0	0
„ Ditto, of copies of the Journal of the Society, ..	17	8	0
„ Ditto, of old seed boxes sold, ...	14	7	0
„ the Secretary, being the balance of amount awarded for prizes to mallees at the Exhibitions held on 26th January and 25th October, ...	20	0	0
„ the Collector of Patna, being the amount cost of ten maunds of Carolina paddy, purchased by the Society, on account of the Commissioner of Patna, ...	61	15	0
„ Accruals of interest on fixed as etc, ...	461	11	3
	<u>1,165</u>	7	9
Total Receipts, Co's Rs ..	17,955	14	5
Balance in the Bank of Bengal, on the 31st December, 1842, ...	54	1	11
Ditto, in the hands of the Government Agent on ditto ..	160	7	5
	<u>714</u>	9	1
Grand Total Receipts, Co's Rs ..	<u>18,670</u>	7	7

DISBURSEMENTS.

FOREIGN VEGETABLE AND FLOWER SEEDS

By C. N. Villet, for Cape garden and flower seeds, ...	2,000	0	0
„ Messrs. Landreth and Co of Philadelphia, for American vegetable and flower seeds, ...	507	8	0

AMERICAN COTTON SEED

By Messrs. Grindlay and Co. for charges incurred for freight, &c. on New Orleans cotton seed, transmitted via Liverpool, ...	181	12	0
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FLAX AND HEMP SEED

By Mr. Deneef for a quantity of acclimated English flax seed, ...	42	0	0
„ Mr. Holstem, for a quantity of Russian hemp seed, ...	56	0	0

ENGLISH FRUIT TREES, &c.

By Dr. Royle, to meet the cost of English fruit trees, bulbs, &c. ...	234	0	0
„ Messrs. Grindlay and Co, for freight and sundry other charges for transmission of fruit trees in 1842, ...	<u>70</u>	14	9
			3,412

SOCIETY'S TRANSACTIONS, PUBLISHED SOLELY

By Baptist Mission Press, for printing the proceedings of the Society, for February, March, April, May, and June 1842.	10 0
„ Bishop's College Press, for printing 100 copies of Annual Report for 1842, and 500 copies of 'List of Members,' ..	100 0 0
„ Thacker and Co. for expenses incurred by Allen and Co. of London, for duty and other charges on 140 copies of the Transactions of the Society, vol. 1 to 4, transmitted to them for sale, on account of the Society ..	79 1 0
„ Grindlay and Co., for sundry charges on 10 copies of vol. 8, sent in 1842, for presentation to several Societies and individuals in Great Britain ..	45 6

LIBRARY

By Books purchased during the year for the Library ..

PRINTING

By sundry parties, for printing receipts, &c. ..

JOURNAL

By Printer Medical Journal Press, for printing Nos. 1 and 5 of vol. 1 of the Journal, ..	0 0 0
„ Bishop's College Press, for printing No. 4 to 6 of vol. 1 of the Journal, ..	36 1 6
„ C. Grant, for lithographing plates for Journal, ..	72 0 0
„ Printer Medical Journal Press for lithographing a plate and for other petty charges, ..	45 0 0
„ T. Ballin for striking off impressions on covers for No. 4 and 5 of vol. 1, and Nos. 1 to 3 of vol. 2, ..	98 1 0
„ W. Rushton for 16 reams of double demy paper, ..	320 0 0
„ Thacker and Co. for 30 reams of white and two reams of colored demy, ..	364 1 0
„ Baptist Mission Press for 3 reams of demy, ..	40 8 0
„ Needhoney Holder, for 8 reams of colored demy, ..	5 0 0
	<hr/> 2,096 1 0

NURSERY GARDEN.

By expenses incurred on account of the Nursery Garden from 1st December 1842 to 30th November 1843 ..	1,962 8 0
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ESTABLISHMENT.

By amount for establishment, from 1st December 1842 to 30th November 1843, ..	4,321 0 0
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MEDALS.

By Hamilton and Co., for gold and silver medals manufactured engraved on, &c. ..	843 10 6
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LOAN ACCOUNT

By Amount paid back to the Bank of Bengal for loan taken in 1842, ..	1,000 0 0
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INTEREST.

By Bank of Bengal, interest on loan of 1,500 Rs. from 6th October

1842 to 14th August 1843, 99 11 8

PECUNIARY REWARDS

By prizes to mallees at the Exhibitions held on the 26th January

and 28th October, 400 0 0

„ the Hoogly Branch Society, annual amount, 50 0 0

„ the Bhaugleapore ditto ditto, 50 0 0

500 0 0

FREIGHT.

By freight on boxes of seeds, from America, Madras, Patna, &c. 88 4 6

ADVERTISEMENTS

By advertising in the public prints, notice of meeting, distribution

of seeds, sugar cane, &c. &c. &c. 328 1 0

STATIONERY.

By stationery for Office books, and for the use of the Office, 144 7 0

POSTAGE AND PETTY CHARGES.

By postage on the Journal, and for letters sent and received, and

for petty expenses, 1,074 12 6

SUNDRIES

By paid to extra packer men for subdividing seeds, 6 0 0

„ to extra writers, for writing on papers of ditto, 6 5 0

„ for a set of flax dressing implements, 20 0 0

„ to Mr Wray, for six copies of his "Sugar Planter's Companion," 30 0 0

„ Custom House duty on brown packing paper, 15 0 0

„ present to Bandsmen of the 10th Regiment, 18 0 0

128 5 0

Total Disbursements, Rs. 17,501 15 8

Balance in the Bank of Bengal on the 31st December 1843, 946 7 3

Ditto in the hands of the Government Agent on ditto, 222 2 8

1,169 9 11

Grand Total, Rupees ... 18,670

MEMORANDUM.

DISBURSEMENTS		RECEIPTS	
To amount of Disbursements during the year 1847, as per statement,	17,504 13 8	By amount of receipts during the year 1847, as per statement,	17,925 14 3
Balance in the Bank of Bengal on the 31st December 1843,	946 7 3	" balance in the Bank of Bengal on the 1st December 1842,	554 1 11
Ditto in the hands of the Government Agent on ditto,	222 2 2	" Ditto in the hands of the Government Agent on ditto,	190 0 3
	<u>1478 9 11</u>		<u>744 0 4</u>
Total, Co's Rs.	18,670 7 7	Total Co's Rs.	18,670 7 7
DEPENDENCIES		EXPENDITURES	
Amount invested in Government Securities, lodged in the Government Agency Office, ...	19,433 5 4	Amount drawn in Society of Friends, paid for printing its Transactions, Journal, &c., ...	2,044 12 3
Amount of Subscription in arrears,	5,677 4 0	Amount for prizes for copies, improvement in the English Church, &c. &c.,	2,546 0 0
Total Co's Rs.	17,010 9 4	Total, Co's Rs.	4,590 12 3

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LIST OF MEMBERS
OF THE
Agricultural & Horticultural Society
INDIA.

APRIL 1ST 1844.

Patron:

THE RIGHT HONORABLE EDWARD, LORD ELLENBOROUGH,
GOVERNOR GENERAL OF INDIA, ETC. ETC. ETC.

OFFICE BEARERS.

President:

THE HON. SIR JOHN PETER GRANT.

Vice-Presidents:

C. K. ROBISON, ESQ.
WILLIAM GRIFFITH, ESQ.
BABOO RAMCOMUL SEN.
BABOO DWARKANATH TAGORE.

Honorary Secretary:

JAMES HUME, ESQ.

Deputy Secretary & Collector:

A. H. BLECHYNDEN, ESQ.

List of Members.

* This mark denotes Members who have compounded for their Annual Subscriptions.

† This mark denotes Members who are absent from India, and therefore Non-contributors.

HONORARY MEMBERS.

The Right Honorable Sir Edward Ryan, A. M. F. A. S., *London.*
Baron Von Ludwig, *Cape of Good Hope.*
Charles Huffnagle, Esq. M.D., *Calcutta.*
John Forbes Royle, Esq. M.D. F.R.S. F.L.S. F.G.S. *Professor of Materia Medica, King's College, London.*
Colonel John Colvin, C.B., *Bengal Engineers, London.*
Thomas Waghorn, Esq. *Egypt.*
J. Mackay, Esq.
Don Ramas de la Sagra, *Island of Cuba.*
Dr. Justus Liebig, *Professor of Chemistry in the University of Giessen, Germany.*

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Agabeg, Joseph, Esq. *Merchant, Calcutta.*
Ainslie,† William, Esq. *Merchant.*
Ainslie, Daniel, Esq. *Merchant, Calcutta.*
Alexander,† Nathaniel, Esq. *Merchant.*
Alexander,† J. W. *Assignee of Insolvent Estates, &c.*
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Allan, John, Esq. *Merchant, Calcutta.*
Allen, C., Esq. *Civil service, Cawnpore.*
Alves,† Colonel N., *Governor General's Agent for affairs of Rajpootana.*

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 Annand, Adam Smith, Esq. *Civil service, Sylhet*.
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 Bennett, William, Esq. *Sugar planter, Subulpoore Factory, Commercially*.
 Bentall,* Edward, Esq. *Civil service, Jessore*.
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1.—The profits are declared in each year, on the second Wednesday in May on which date all Persons assured in the Society for the whole term of 10 years whose Policies have been in existence five complete years, are entitled to participate.

2.—One-fifth of the retained profits of the five preceding years is divided between the Policy-holders and Share-holders, three-fourths to the former, and one-fourth to the latter. The remaining four-fifths are set apart to enter into average of the succeeding years, and thus to provide against unforeseen contingencies.

3.—The first division of profits was declared on the 13th May, 1840, in London and on the 15th August in India, amounting to a reduction of 60 per cent. on the annual premium of all Policies entitled to participation. A similar reduction has been made for the two following years, arising from the division of profits for 1841 and 1842. On the fourth division, viz. in May 1843, the reduction of premium was equivalent to 50 per cent. on the annual amount.

The following table will show the operation of the last reduction made by

	Date of Policy	Indian Assurance		Reduction	Annual Premium payable in 1844
		Co.'s Rs.	Rs.	Rs.	Rs.
20	May, 1838	10,000	320	20	216
30	"	10,000	480	240	260
40	"	10,000	590	290	295
50	"	16,000	740	370	370
60	"	10,000	1,050	515	515

5.—This system of reduction in the Premiums affords immediate benefit to the Assured, or enables them to secure a considerable bonus by effecting a new Policy.

6.—Separate tables, both Civil and Military, have been adopted for the *whole of life* at reduced rates for such persons as may prefer a lower rate of Premium to participation in the general profits.

7.—Any person assured for the *whole term of Life*, will on his return to Europe, for a continuance be permitted to pay premiums according to the English rate for the age at which he originally assured, provided he has already paid the Indian premium, on his policy for five clear years.

8.—In case the party should not have paid the Indian premium for five years, he will be required to pay one year's Indian premium after his return to Europe, and will then be admitted to the English rate for the age at which he originally assured.

9.—A person holding a policy after a not exceeding seven years, on his return to Europe for a *continuance*, will be required to pay six months' Indian premium, after his return, before he is admitted to the English rate for the age at which he originally assured,—in this no reference is made to time during which the policy has been in force.

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11.—In all cases of reduction to the English rate, the Policies are to be subject to all the regulations and conditions affecting English Policies.

12.—When application is made for assurance, the subject to be insured, in order to hazard, an augmented premium will be charged proportionate to the increased risk, the rate of which will be regulated with strictest attention to justice between the Society and the Assured according to circumstances.

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14.—All Policies becoming claims on the Society will be discharged immediately after satisfactory proof of the death and cause of death, of the Assured shall have been furnished to the Directors either in London or Calcutta.

15.—The Directors of the India branch of the Society are empowered to treat for the purchase of Policies for the *whole term of life* or *any term*, premium shall have been paid for a period of not less than five years, in advance, if required, on such Policies, by way of loan, two-thirds of the estimated value.

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